

SIEMENS



SCALANCE X - Industrial Ethernet Switches

SIMATIC NET

Brochure

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Answers for industry.

Industrial Ethernet

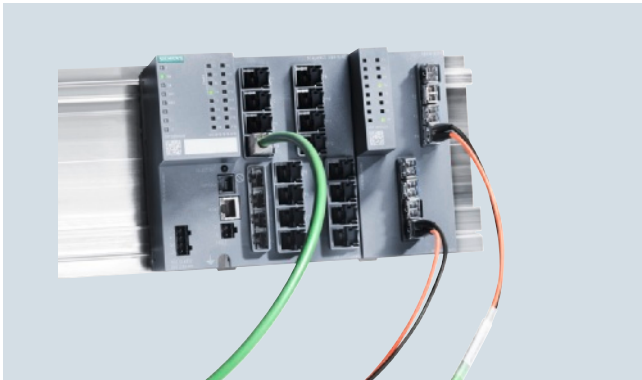
Industrial Ethernet Networking

With Totally Integrated Automation, Siemens is the only manufacturer to offer an integrated range of products and systems for automation in all industries – from incoming goods and the production process to outgoing goods, from the field level through the production control level to connection with the corporate management level. SIMATIC NET offers all the components for industrial communication: from industrial communications processors right up to network components – even wireless if required.

The ever expanding spread of Ethernet in the industrial environment makes it increasingly important to structure the resulting Industrial Ethernet/PROFINET networks.

SIMATIC NET offers various **Industrial Ethernet switches** to achieve maximum uniformity of the networks and seamless integration of the industrial plants.

They are used for the structured networking of machines and plants as well as for integrating them into the overall corporate network. A graded portfolio of switches up to communication processors with integrated switch enables optimum solutions for all types of industrial communication in all environments – from production up to the harshest outdoor application. The SCALANCE X and RUGGEDCOM product lines.



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Communication for every environment

Backbone for all sectors

With the SCALANCE X and RUGGEDCOM products, Siemens offers a comprehensive range of network products from a single source: irrespective of whether you require error-free communication even with strong electromagnetic interferences, extreme temperatures and over long distances, or whether fast, efficient data transmission from the process level up to the corporate level is concerned, Siemens is your partner.

SCALANCE X Industrial Ethernet switches

SCALANCE offers many different manners in which PROFINET/Industrial Ethernet can be used with Totally Integrated Automation (TIA), thus guaranteeing simple integration into automation and IT landscapes.



Convenient selection tools are available to assist you in selecting the right Industrial Ethernet switches, cables and connectors as well as in configuring the modular variants; see: www.siemens.com/snst and www.siemens.com/tia-selection-tool

RUGGEDCOM Industrial Ethernet switches

The network components from the RUGGEDCOM portfolio have been designed primarily for critical applications under extremely harsh environmental conditions in accordance with the IEC 61850 standard.



Additional information on RUGGEDCOM can be found at www.siemens.com/ruggedcom

Industrial communication differs fundamentally from the communication that is used in the office environment. In the office environment, many clients communicate with one server; there are no cross-connections between clients. This type of data transmission can cause bottlenecks and delays when communication links are being established, when too many clients access a server simultaneously.

This cannot be used for automation because cyclically executing process programs require up-to-date input data in order to issue the appropriate control commands to components.

It is additionally necessary to individually adapt applications, communication relationships and network structures – regardless of whether the plants are in the industrial or energy sector, in transportation systems or infrastructures.

It must always be ensured, however, that the capacity of the network and therefore the plant or machines is optimally utilized and any downtimes minimized. All the production and management processes must perfectly interact.

These requirements can only be satisfied when it is based on an open, company-wide communication system that permeates the entire company and extends beyond its boundaries. Island solutions are avoided in automation and information technology, so the following preconditions must apply:

- Continuous flow of information from the actuator/sensor level through to the corporate management level
- Availability of information at every location
- Fast exchange of data between the plant sections
- Easy, plant-wide configuring and efficient diagnostics
- Integrated security functions that block unauthorized access

Industrial Ethernet

Communication in industrial environments

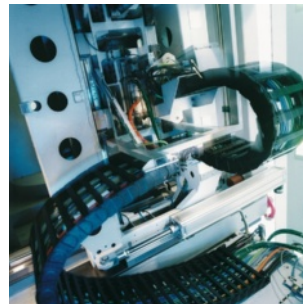
Totally Integrated Automation

The network and automation components of SIMATIC NET are part of Totally Integrated Automation (TIA), an integrated range of products and systems for automation in all areas – from incoming goods, through the production process to outgoing goods, and from the field level, through to the connection to the corporate management level. These components feature the highest possible degree of integration because they access a common database which, in turn, saves data entry costs and ensures consistency throughout the project.

Availability and performance

The demand for high network availability for powerful networks in the various automation applications is rising continuously. Different topologies such as line, ring or star offer wide-ranging possibilities, e.g. when implementing a production line or manufacturing cell.

Industrial Ethernet is a high-performance area and cell network designed to the IEEE 802.3 (Ethernet) standard that can be used to set up powerful communication networks extending over long distances. PROFINET, the open Industrial Ethernet Standard, uses Industrial Ethernet and facilitates real-time communication right down to the field level. If existing IT standards are fully utilized, PROFINET even permits isochronous motion control applications to be implemented via Industrial Ethernet.



Network performance and technologies

When combined, the current Industrial Ethernet technologies can significantly boost performance in the network. These technologies are:

- **Fast Ethernet** at 100 Mbps:
Message frames are transported much faster than by Ethernet (10 Mbps) and therefore only occupy the bus for an extremely short time. For Fast Ethernet, a 4-wire FastConnect cabling system (Cat5e) is available with cable, plug and outlet
- **Gigabit Ethernet** at 1 Gbps:
Gigabit Ethernet is faster than Fast Ethernet by a factor of 10, so the bus is occupied for only one tenth of the time. For Gigabit Ethernet, an 8-wire FastConnect cabling system (Cat6) is available with cable, plug and outlet
- **Gigabit Ethernet** with 10 Gbps:
Compared to Ethernet with 1 Gbps, Ethernet with 10 Gbps is faster by a factor of 10
- **Full Duplex** avoids collisions:
data throughput is increased hugely since the usual message frame repetitions are avoided. Data can be sent and received simultaneously between two nodes. The data throughput for a full duplex connection therefore rises to 200 Mbps with Fast Ethernet and to 2 Gbps with Gigabit Ethernet.
With full duplex, greater network expansion is also possible. This means, for example, that when glass fiber-optic cables are used, distances of 120 km and more can be achieved between two nodes

- **Switching** permits parallel communication:
When a network is subdivided into several segments using a switch, this results in load separation. Data communication is possible in each individual segment independently of the other segments. In the overall network, several message frames can therefore be en-route simultaneously. The performance gain is due to the simultaneity of several message frames
- **Autocrossover** automatically crosses the send and receive cables on Twisted Pair interfaces
- **Autosensing** describes the characteristic of network nodes (terminal devices and network components) that automatically detect the transmission rate of a signal (10 Mbps, 100 Mbps, or 1 Gbps) and support autonegotiation.
- **Autonegotiation** is a configuration protocol
Before initiating the actual data transmission, network devices automatically negotiate a transmission mode that all devices can use (10/100/1000 Mbps, full duplex or half duplex)



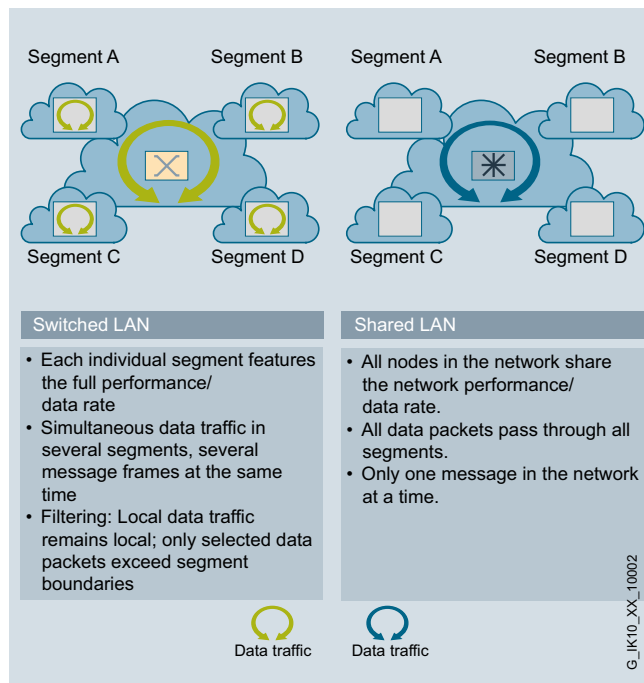
Industrial Ethernet

Advantages of the switching technology

Industrial Ethernet Switches are active network components that support the different network topologies: Networks can be constructed with switches in electrical or optical line, star and ring topologies. These active network components specifically distribute data to the relevant addressees.

SIMATIC NET offers the right Industrial Ethernet switch or a component with switch functionality for every application:

- **Compact Switch Modules (CSMs)** for additional ports directly on SIMATIC
- **Unmanaged** and **managed switches** of the **SCALANCE X** product group, perfectly tuned to the respective automation and networking task for integration in PROFINET
- **Communication processors (CPs)** for SIMATIC and the PC that handle the switching of smaller network segments in addition to their actual task, supporting the CPU in communication tasks



Switched LAN

Electrical or optical cabling systems are used as the transmission medium between the switches. Terminal devices are connected electrically over twisted-pair cables.

The switching technology permits parallel communication, i.e. a network is divided into several segments, thereby resulting in load separation. Data communication is therefore possible in each individual segment independently of the other segments. This means that, throughout the network, multiple message frames can be in transit at the same time. The performance gain is due to the simultaneity of several message frames.

The switching technology offers definite advantages over shared LAN

- Switches can be used to construct subnets and network segments
- Data throughput and network performance are increased by structuring data communication.
- The rules for network configuration are simple
- Network topologies with 50 switches in a ring and an overall extension of up to 150 km can be implemented without the need to take signal propagation times into account.
- Unlimited expansion of the network by connecting individual collision domains/subnets (beyond 150 km, the signal propagation times must be taken into account)
- Easy, reaction-free extension of existing networks is possible

High availability thanks to redundant networks

High system availability resulting from redundancy

Production plants are designed and calculated to ensure high availability. The consequences of a system failure are, therefore, costly downtimes, high restarting costs and the loss of valuable data or materials. Redundant control systems and redundantly configured networks protect plant from failures in their automation systems. In the event of a fault, the high-availability communication can take over automatically without any consequences for the plant. To achieve the extremely fast response times required by industrial companies, SIMATIC NET has for many years used standardized network redundancy procedures that support reconfiguration times of a few milliseconds in the event of a fault. For critical applications with high-availability requirements that do not permit any additional delay in communication, Siemens offers various solutions for Industrial Ethernet networks.

In general, there are two types of redundancy:

- **System redundancy:** A high-availability automation system is implemented by deploying systems and communication components in duplicate
- **Media redundancy:** Systems are only implemented individually, but in the event of an interruption in the network, the plant will continue to operate along substitute communication paths

Seamless redundancy systems

Parallel Redundancy Protocol (PRP)

The PRP redundancy procedure in accordance with the IEC 62439-3 standard is based on double transmission of message frames over two separate networks.

The access points SCALANCE X-200RNA for PRP networks connect up to two network segments or terminal devices without PRP functionality, without delay, over two parallel networks.

High-availability Seamless Redundancy Protocol (HSR)

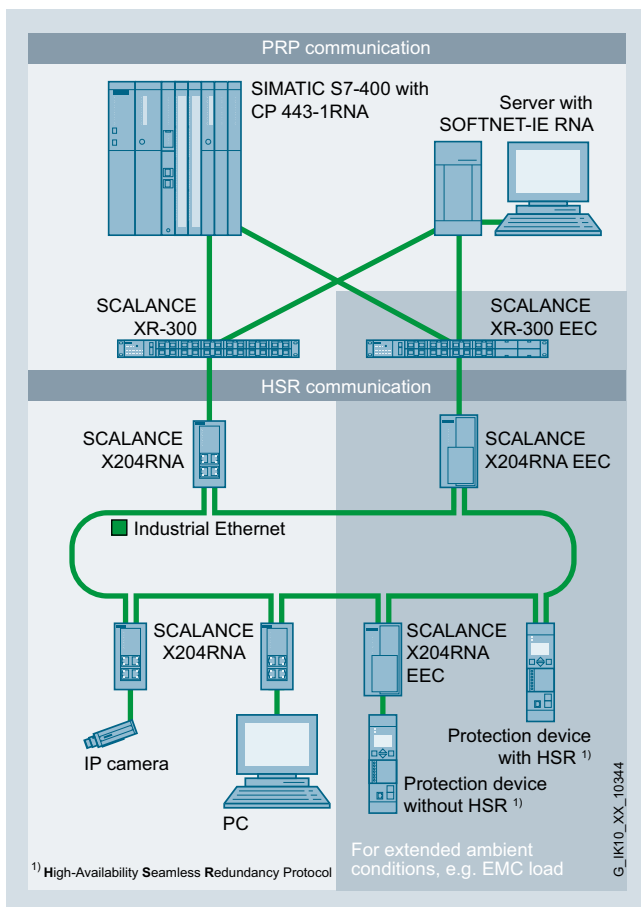
The HSR procedure in accordance with the IEC 62439-3 standard is based on double transmission of message frames over ring topology networks in both directions.

In the case of a fault, the message frame will be transmitted without any delay. No reconfiguration time (relearning of the communication paths) is necessary for the network, as is the case for most other redundancy procedures.

One PRP network and one HSR network are coupled redundantly over SCALANCE X204RNA or SCALANCE X204RNA EEC. These redundancy techniques are used, in particular, in plants with high network availability.

Product versions:

- SCALANCE X204RNA
- SCALANCE 204RNA EEC for environments with high EMC load



Example configuration: redundant network topology with PRP and HSR communication

Industrial Ethernet

High availability thanks to redundant networks

MRPD

High network availability can be achieved without reconfiguration time using the PROFINET-compatible MRPD procedure (Media Redundancy for Planned Duplication).

The MRPD protocol is an extension to the MRP protocol for sending message frames in duplicate within a ring topology. Networks can only be constructed with SCALANCE X-200IRT switches and additional components with the real-time feature Isochronous Real-Time IRT (PROFINET standard), such as SIMATIC controllers, ET 200, SIMOTION and SINAMICS drives.



High Speed Redundancy Protocol (HRP)

For use in high-availability plant networks, fast redundancy in the ring can be implemented with High Speed Redundancy. The reconfiguration time for 50 switches in the ring is up to 300 ms.

Standby coupling

Industrial Ethernet switches of the SCALANCE X-300 and X-400 product lines are equipped with this function for the redundant coupling of network segments, such as coupling of redundant ring topologies. This is particularly necessary in process automation to meet the demanding requirements of network availability.

(Rapid) Spanning Tree Protocol STP/RSTP

(Rapid) Spanning Tree is a redundancy procedure with a minimal response time that has been standardized in IEEE-802.1D (2004). The reconfiguration times depend on the topology and start at around 50 ms.

Router redundancy VRRP (Virtual Router Redundancy Protocol)

Layer 3 switches, such as SCALANCE X-500, support router redundancy as well as parallel routing over several paths which increase the availability of the network significantly. They are therefore suitable for use in high-performance plant networks (e.g. with high-speed redundancy). Since IT standards are supported (e.g. VLAN, IGMP, RSTP), the seamless integration of automation networks into existing office networks is possible. Routing functions on layer 3 permit communication between different IP subnetworks.



SCALANCE X Industrial Ethernet switches

Overview

Industrial Ethernet switching components comprise:

- Compact Switch Modules (CSMs)
- SCALANCE X Industrial Ethernet switches
- Communications processors (CP) with integral switch

Compact Switch Modules (CSMs)

Unmanaged switches for use directly on the SIMATIC or LOGO! for interface expansion and integration of machines into existing plant networks.

SCALANCE X-000/XB-000 unmanaged

Unmanaged switches with electrical and optical ports for establishing small networks for machine and process cells with 10/100/1000 Mbps.

SCALANCE X-100 unmanaged

Switches with electrical and/or optical ports, redundant power supply, and signaling contact for use in machine-level applications (also available as media converters with two ports for converting between different media).

SCALANCE X-200 managed

Universally applicable, from machine-level applications to networked plant sections. Configuration and remote diagnostics are integrated in the STEP 7 engineering tool. This increases the level of plant availability. Devices with a high degree of protection permit a cabinet-free construction.

Appropriate switches (SCALANCE X-200IRT) are also available for use in subsystem networks requiring strict real-time and maximum availability.

SCALANCE XF-200 managed

SCALANCE XF-200 Industrial Ethernet switches have the same functions as SCALANCE X-200 switches. Their type of construction in the slim design of the ET 200S distributed I/O (degree of protection IP20) makes them ideal for space-saving use in small control boxes.

SCALANCE X-300 managed

Networking of subsystems/plant areas, as well as interfacing to the enterprise network. The SCALANCE X-300 managed product line combines the firmware functionality of the SCALANCE X-400 line with the compact design of the SCALANCE X-200 line. As a result, SCALANCE X-300 switches feature expanded management functions and enhanced firmware functionality compared to SCALANCE X-200 switches. Electrical and optical Gigabit Ethernet ports are also available.

The SCALANCE XR-300 Industrial Ethernet switches correspond functionally to the SCALANCE X-300 switches. As rack switches, they are especially suited for use in 19" control cabinets. They are also fully modular, and due to their 2-port media modules (electrical and optical) they can be adapted to the respective task.

ECC (Enhanced Environmental Conditions) versions may be used in compact and rack designs for application in power plants and under difficult environmental conditions.

SCALANCE XM-400 managed (layer 3)

For use in high-performance plant networks (e.g. with high-speed redundancy). Due to the modular structure with port extender, the switches can be adapted to the task in question. Since IT standards are supported (e.g. VLAN, IGMP, RSTP), the seamless integration of automation networks into existing office networks is possible. Routing functions on layer 3 permit communication between different IP subnetworks. A mobile diagnostics facility is implemented using NFC (Near Field Communication) and WLAN.

SCALANCE X-500 managed (layer 3)

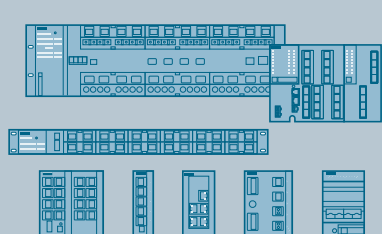

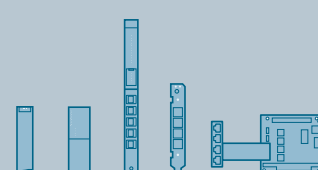
For networking and structuring high-performance industrial networks and for connecting office networks to automation networks.

As a layer 3 switch, SCALANCE X-500 can be used as a central component in backbone networks, e.g. when a high number of slots is required, with extremely high transmission rates (10 Gigabit Ethernet), or for redundant connection to an office infrastructure.

The rack switch (19" design) can be used flexibly to suit requirements thanks to its modular design and the plug-in 4-port media modules (electrical and optical). Routing functions on layer 3 permit communication between different IP subnetworks.

SCALANCE X Industrial Ethernet switches

Overview

Network component	CSM	Integral switch function
		
<ul style="list-style-type: none"> • Basis for integrated networking in industrial automation - from the field to the management level • Network components optimized for various applications: <ul style="list-style-type: none"> - Small and large-scale structured networks - Management functions - Connection to IT networks - Configuring of redundant networks - Use with Industrial Ethernet and PROFINET • Robust housing for harsh environments • Graded diagnostics concept 	<ul style="list-style-type: none"> • Configuration of small networks • Easy expansion of the number of ports for: <ul style="list-style-type: none"> - Connection of local HMI systems - Connection to higher-level networks - Service/maintenance • Space-saving design of SIMATIC • Unmanaged Switch with local diagnostics 	<ul style="list-style-type: none"> • Communications processor for interfacing with PROFINET/Industrial Ethernet including integral switch for: <ul style="list-style-type: none"> - For interfacing with distributed I/O. - Connection to higher-level networks - IP routing - Service/maintenance • SIMATIC or PC module design • Functions for network diagnostics

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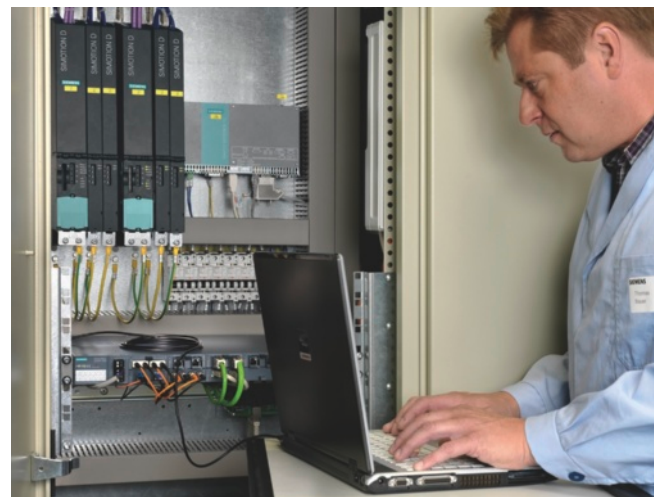
Criteria for selecting Industrial Ethernet switching components

Communications processors for SIMATIC with integral switch

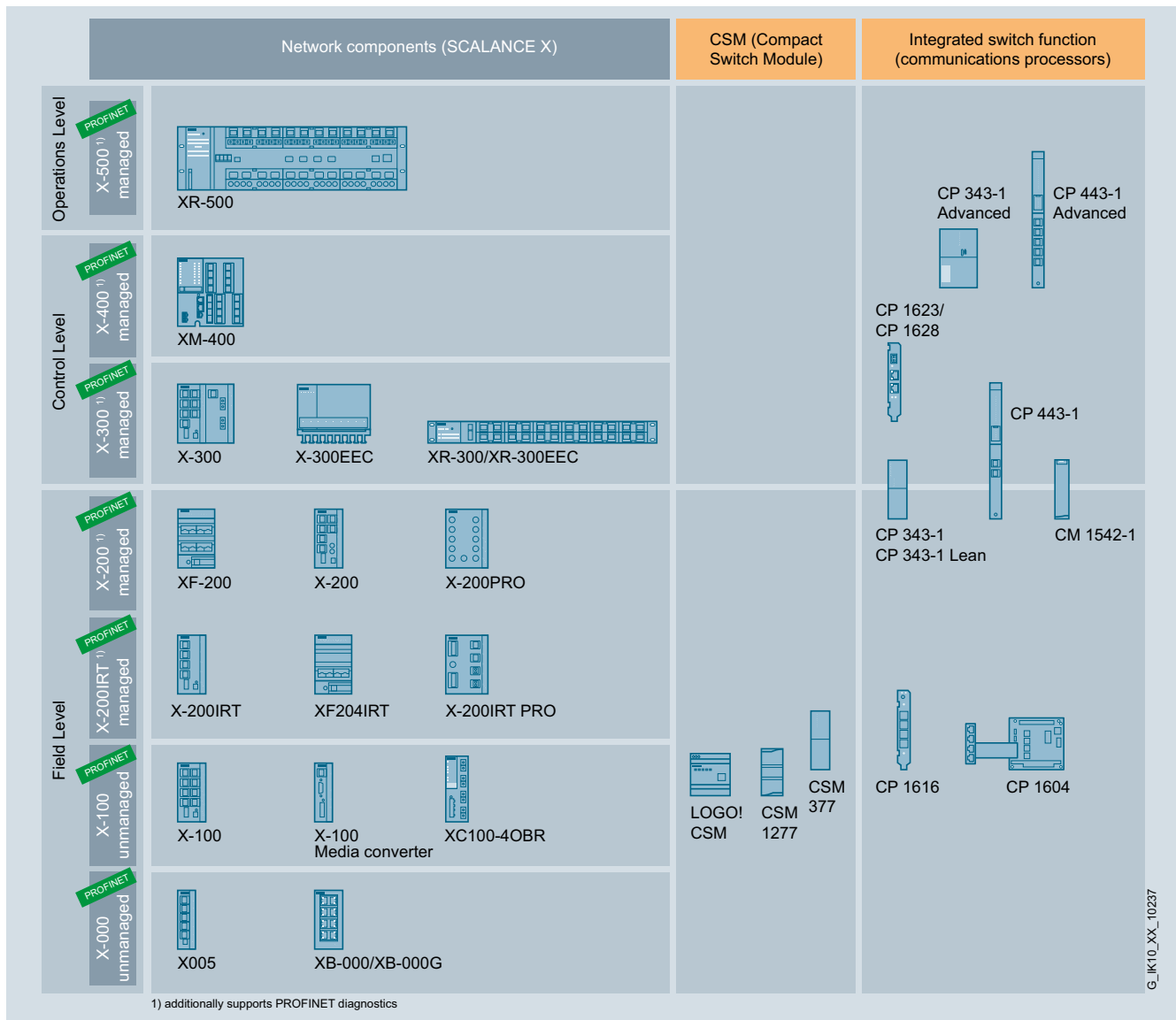
Managed switches for adding Industrial Ethernet/PROFINET interfaces to the SIMATIC and for integrating the controllers into existing line or ring topologies. Thanks to integral Layer 3 functionality, the Advanced-CPs can also be used as routers between IP subnets.

Communications processors for PCs with integral switch

Managed switches for adding Industrial Ethernet/PROFINET interfaces to industrial PCs and for integrating PCs into existing line topologies.



Configuration of a SCALANCE XR-300



Overview of SCALANCE X Industrial Ethernet switches and SIMATIC components with switch functionality

SCALANCE X Industrial Ethernet switches

Overview

Application areas / type of network / requirements			Office incorporation	Plant networking	Industry-related applications	Energy generation and distribution	Wind energy plants	Machine building and plant engineering	Plant subnetworking	High-volume machine building	Internal machine networking	Network setup using SIMATIC S7	PC-based applications
X-500		High-performance backbone networks with very high emphasis on functionality / port density / availability and interface to IT network	•	•	•								
X-400		High-performance plant network with high emphasis on functionality and availability	•	•	•								
X-300	X-300EEC/ XR-300EEC	Large networks with high emphasis on functionality and availability		•		•	•						
X-200								•	•				
	X204RNA	Networks with higher emphasis on functionality and availability		•					•				
	X204RNA EEC			•	•	•							
X-100		Networks with low emphasis on functionality						•		•			
X-000		Networks with low emphasis on functionality and robustness								•	•		
CSM		Very small networks or interface expansion for SIMATIC S7										•	
CPs		Very small networks through integrated switch in CP										•	•

• applies

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SCALANCE X Industrial Ethernet switches: Areas of application

Features		Modular through media modules	19" design	Support of Gigabit Ethernet	Additional interface for SIMATIC S7	Power-over-Ethernet	Can be used under Enhanced Environmental Conditions (EEC)	Isynchronous Real-Time (IRT)	Layer 3	Office features (VLAN)	Diagnosis	PROFINET IO Device	Time synchronization according to IEEE 1588
X-500		•	•	•		•			•	•	•	•	
X-400		•		•					•	•	•	•	
X-300		•	•	•		•				•	•	•	
	X-300EEC/ XR-300EEC	•	•	•			•				•	•	•
X-200								• ²⁾			•	•	
	X204RNA						•				•		
	X204RNA EEC						•				•		
X-100						•							
X-000				• ¹⁾									
CSM					•								
CPs ³⁾					•				•		•	•	

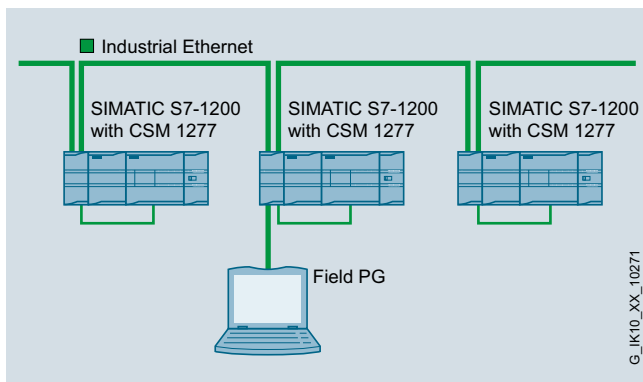
• applies 1) with Gigabit version 2) with IRT version 3) SIMATIC S7 Advanced CPs only

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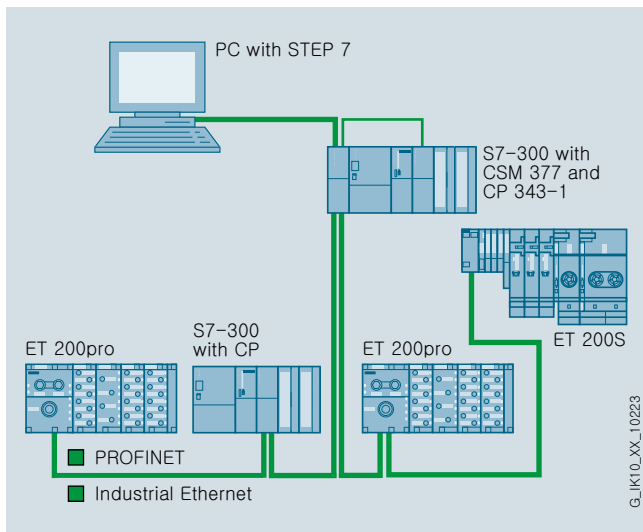
SCALANCE X Industrial Ethernet switches: Function overview

Compact Switch Modules LOGO! CSM, CSM 1277, and CSM 377

The Compact Switch Modules LOGO! CSM, CSM 1277, and CSM 377 are unmanaged switches for simple and rapid connection of a LOGO!, SIMATIC S7-1200, S7-300, or ET 200M to an electrical Industrial Ethernet network. The low-cost switches are thus suitable for the integration of small machines into existing automation networks, for stand-alone operation of machines, or to set up small, local Ethernet networks.



Connection of SIMATIC S7-1200 with CSM 1277 to Industrial Ethernet with line topology



Connection of SIMATIC S7-300 with CSM 377 to Industrial Ethernet with linear structure

Properties at a glance

LOGO! CSM unmanaged

- Multiplication of the Ethernet interfaces of a LOGO! logic module. One port is on the front for easy diagnostics access
- Two versions for the voltage ranges 12/24 V DC or 230 V AC/DC
- Low-cost solution for implementing small, local Ethernet networks

CSM 1277 unmanaged

- Saving on installation costs and installation space compared to the use of an external network component
- Multiplication of the Ethernet interfaces on a SIMATIC S7-1200 for additional connection of programming devices, operator controls, and other Ethernet nodes
- Lowest-cost solution for implementing small, local Ethernet networks with a SIMATIC S7-1200

CSM 377 unmanaged

- Integration into SIMATIC S7-300 and ET200 M for implementing small, local Ethernet networks
- Diagnostics on the device by means of LEDs (power, link status, data communication)
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug



SCALANCE X Industrial Ethernet switches

SCALANCE X-000 unmanaged

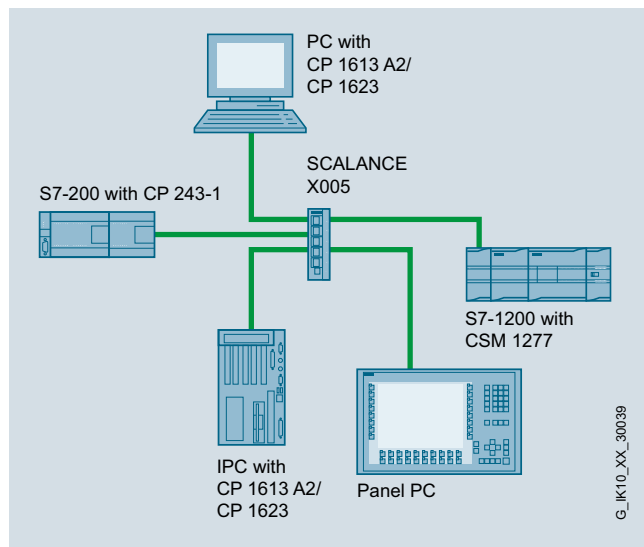
The Industrial Ethernet switch SCALANCE X005 is an unmanaged switch with five RJ45 ports, 10/100 Mbps. The product is a low-cost solution for establishing small star or line topologies with switching functionality in machines islands or process cells. SCALANCE X005 has a rugged metal housing (IP30) for space-saving installation in the control cabinet, on standard rails or S7-300 rails, or for direct wall mounting.

The following versions are available:

- SCALANCE X005 with five electrical ports (RJ45)
- SCALANCE X005TS (Transportation Systems) with five electrical ports (RJ45); suitable for use in railroad and traffic applications with extended temperature range in accordance with EN 50155 and e1/E1

Properties at a glance

- Diagnostics on the device by means of LEDs (power, link status, data communication)
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function
- Use in railway and traffic applications



Star topology with SCALANCE X005



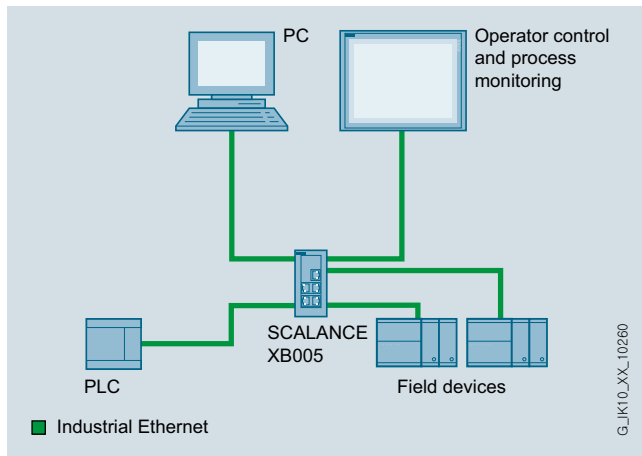
SCALANCE XB-000 unmanaged

The SCALANCE XB-000 Industrial Ethernet switches are compact, unmanaged switches with up to eight ports that enable low-cost establishment of Industrial Ethernet line and star topologies. They have a rugged plastic enclosure (IP20) and save space when installed on standard mounting rails in the control cabinet or control box. The SCALANCE XB-000 switches are available in electrical and electrical/optical versions:

- SCALANCE XB005 with five electrical ports
- SCALANCE XB008 with eight electrical ports
- SCALANCE XB004-1/XB004-1LD with four electrical and one optical port (SC)

For Gigabit cabling (10/100/1000 Mbps), the following versions are available:

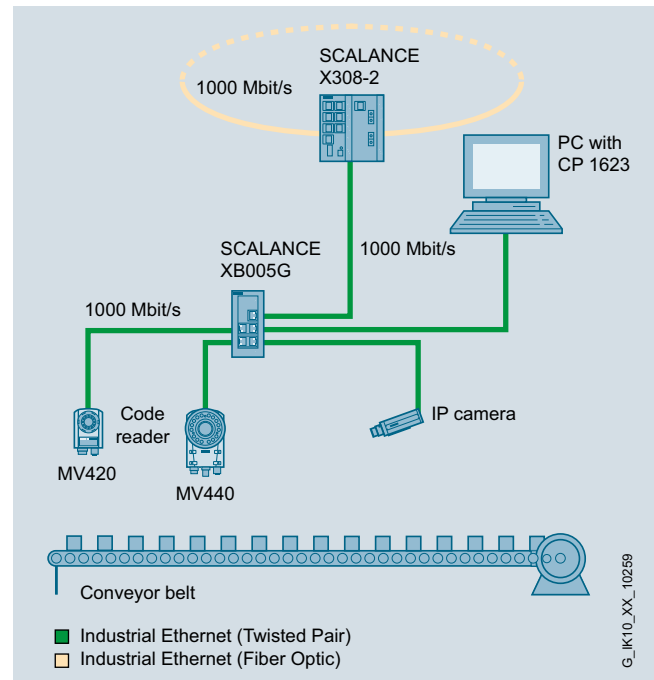
- SCALANCE XB005G with five electrical ports
- SCALANCE XB008G with eight electrical ports
- SCALANCE XB004-1G/XB004-1LDG with four electrical ports and one multimode glass FOC port (SC)



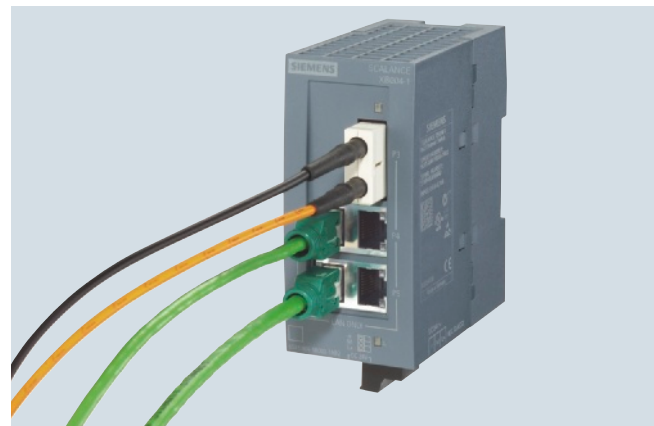
Star topology with SCALANCE XB005

Properties at a glance

- Diagnostics on the device by means of LEDs (power, link status, data communication)
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function

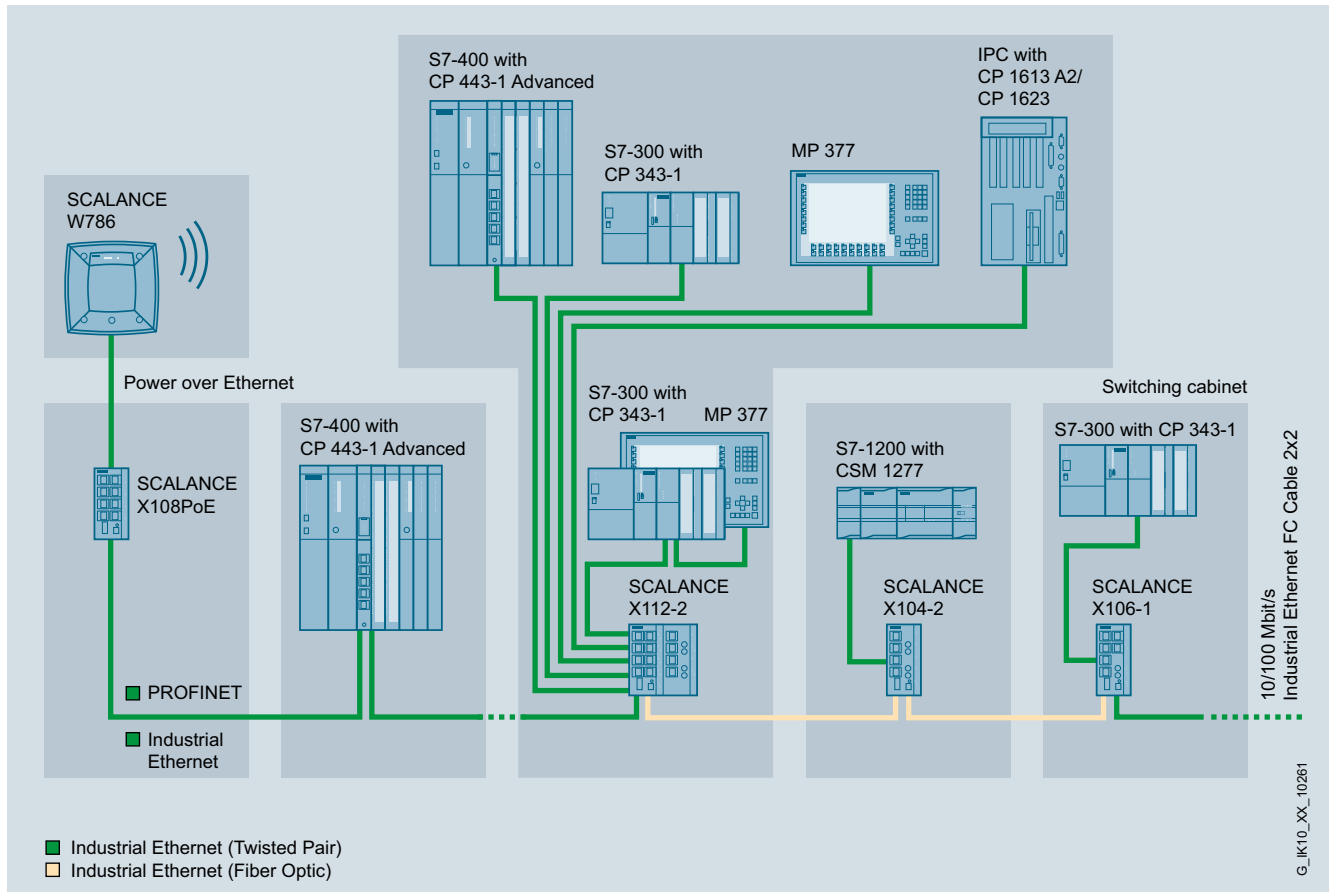


Electrical and optical subnet with SCALANCE XB005G and SCALANCE X308-2



SCALANCE X Industrial Ethernet switches

SCALANCE X-100 unmanaged



Electrical and optical line topology with SCALANCE X-100 and Power-over-Ethernet

The unmanaged switches of the SCALANCE X-100 product range with up to 24 ports are very suitable for setting up line and star structures (10/100 Mbps) and perfect for the on-site diagnostics in machine-level applications.

They are suitable for industry and save room in the control cabinet with their compact housing.

The SCALANCE X-100 switches are available in electrical and electrical/optical versions:

- SCALANCE X108/X108PoE with eight electrical ports
- SCALANCE X116 with 16 electrical ports
- SCALANCE X124 with 24 electrical ports
- SCALANCE X104-2 with four electrical and two optical ports (BFOC)
- SCALANCE X106-1 with six electrical and one optical port (BFOC)
- SCALANCE X112-2 with twelve electrical and two optical ports (BFOC)

Properties at a glance

- Diagnostics on the device by means of LEDs (power, link status, data communication) and signaling contact (signaling mask can be set on site using buttons)
- Redundant power supply
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function
- Power supply of up to two Power-over-Ethernet-enabled terminal devices via four-core data line (SCALANCE X108PoE only)

SCALANCE X-100 media converter

Media converter for converting electrical signals to optical signals and for connecting existing networks, e.g. AUI networks. The SCALANCE X101-1POF media converter is ideally suitable for integrating devices with POF interfaces into existing network structures.

The unmanaged Industrial Ethernet media converters of the SCALANCE X-100 product line are ideally suited to the conversion of different transmission media in Industrial Ethernet networks at 10/100 Mbps in line, star and ring topologies. They are suitable for industry and save room in the control cabinet with their compact housing.

Die SCALANCE X-100 media converters are available in the following versions depending on whether ports are electrical or optical, and they are used to connect existing 10 Mbps fiber-optic networks or existing 10Base5 networks (e.g. SINEC H1):

- SCALANCE X101-1 with one electrical 10/100 Mbps RJ45 port and one 100 Mbps multimode interface (BFOC connection system)
- SCALANCE X101-1LD with one electrical 10/100 Mbps RJ45 port and one 100 Mbps singlemode interface (BFOC connection system)
- SCALANCE X101-1POF with one 100 Mbps plastic optical fiber (POF) interface (SC RJ connection system)
- SCALANCE X101-1AUI with one 10 Mbps AUI interface (D-sub connection system)
- SCALANCE X101-1FL with one 10 Mbps multimode interface (BFOC connection system)



Properties at a glance

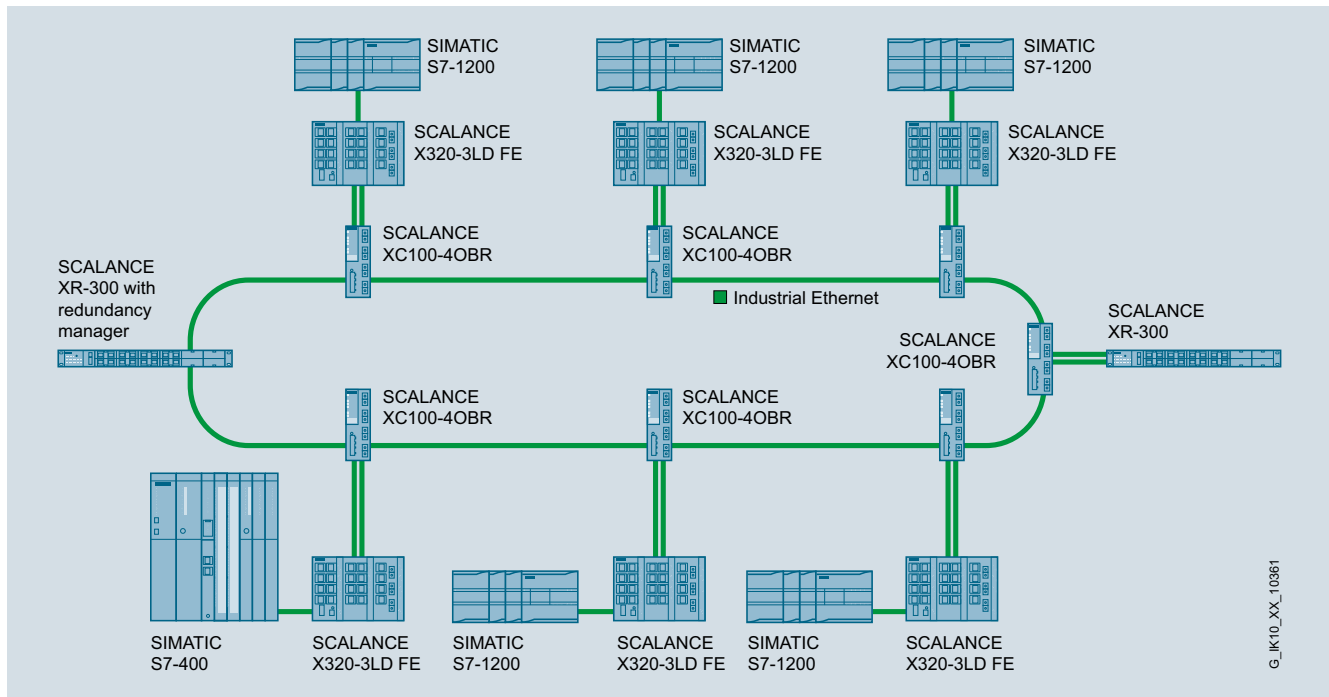
- Diagnostics on the device by means of LEDs (power, link status, data communication) and signaling contact (signaling mask can be set on site using buttons)
- RJ45 sockets with a sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Redundant power supply

	Type and number of ports						Characteristics						
	Twisted Pair		Fiber Optic				Compact enclosure	LED diagnostics	SIMATIC environ- ment	2 x 24 V DC	Signaling contact	On-site display (SET button)	Ring redundancy without RM
			Fast Ethernet										
	10 / 100 Mbit/s	10 Mbit/s	100 Mbit/s			10 Mbit/s							
	RJ45	AUI	POF / PCF	Multimode BFOC	Singlemode BFOC	Multimode BFOC							
SCALANCE X101-1	1			1			●	●	●	●	●	●	
SCALANCE X101-1LD	1				1		●	●	●	●	●	●	
SCALANCE X101-1POF	1		1				●	●	●	●	●	●	G_1K10_XX_10137
SCALANCE X101-1AUI	1	1					●	●	●	●	●	●	
SCALANCE X101-1FL	1					1	●	●	●	●	●	●	

Function overview of Industrial Ethernet media converters

SCALANCE X Industrial Ethernet switches

SCALANCE XC-100 unmanaged/SCALANCE XC100-4OBR unmanaged



Redundant MRP network with SCALANCE XC100-4OBR in ring topology

The SCALANCE XC100-4OBR optical bypass relays are ideally suitable as ballast in Industrial Ethernet networks in linear and ring topologies with data transfer rates of 100/1000 Mbps, especially networks with are difficult to access, for example in pipelines or wind farms. They are used for uninterrupted connection and disconnection of network nodes, e.g. for maintenance work in MRP or HRP (high speed redundancy) rings.

Product versions:

SCALANCE XC100-4OBR with multimode fiber optic ports:

- For linear and ring topologies with four optical SC ports

SCALANCE XC100-4OBR with single-mode fiber-optic ports:

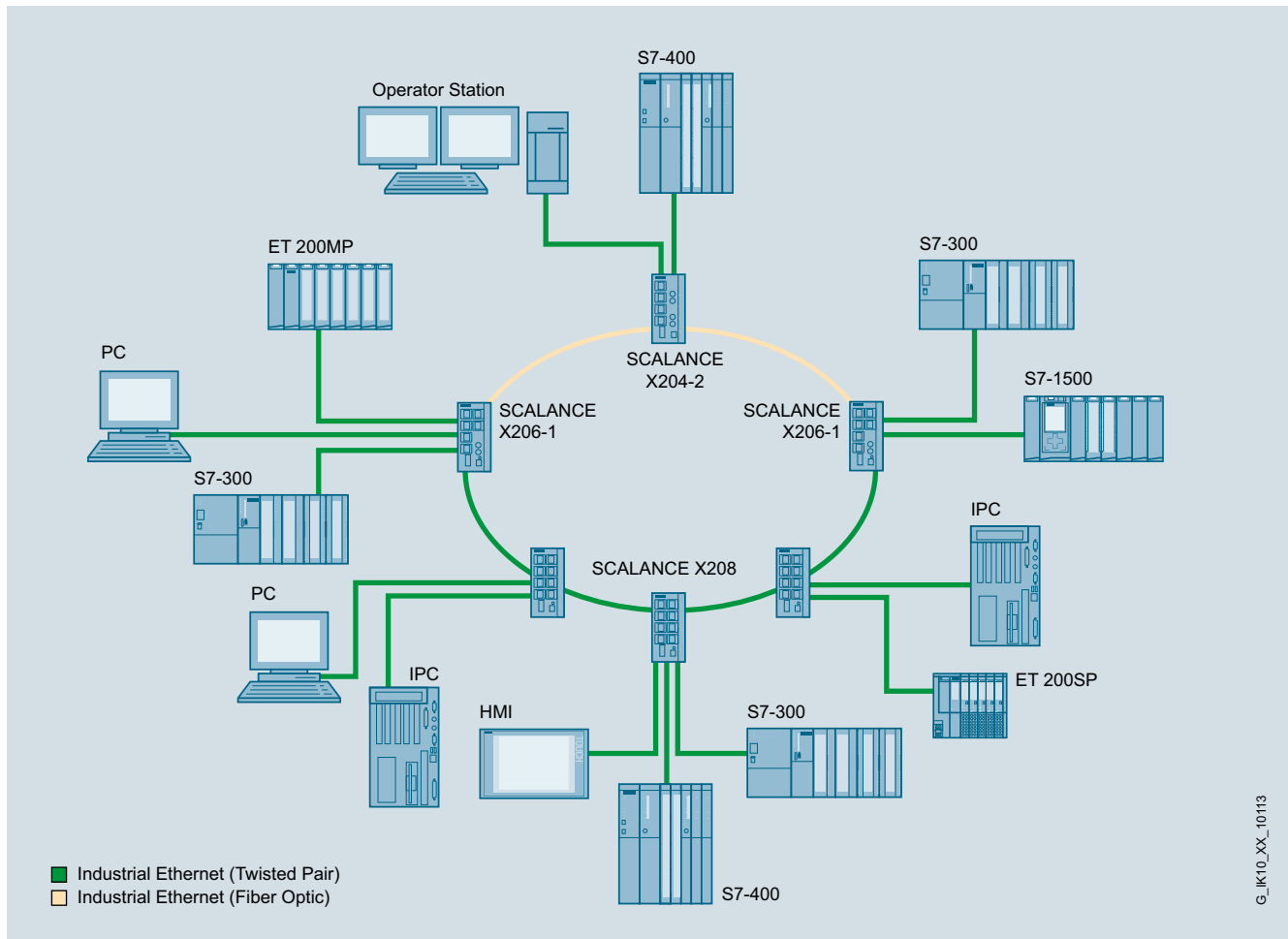
- For linear topologies with four optical SC ports
- For linear and ring topologies with SC ports and TAP function



Properties at a glance

- Simple diagnostics via signaling contact and LED on-site
- Fast bridging of network nodes using optical relays within 10 ms in the event of a fault (e.g. power failure)
- Maintenance of network communication thanks to bridging of the failed network components
- Use in harsh industrial environments thanks to wide temperature range and coated PCBs (conformal coating)
- Combination with different network components thanks to configurable reset delay by means of SET pushbutton on the device
- High device availability thanks to redundant voltage infeed and large voltage range (12 V DC, 24 V DC, 48 V DC)

SCALANCE X-200 managed



High speed redundancy in the ring with electrical and optical paths

The managed switches of the SCALANCE X-200 product range are very well suited for the setup of line, star, and ring topologies (10/100 Mbps).

Redundant ring topologies can be established via the SCALANCE X-200 switches.

On the failure of a transmission link or a SCALANCE X-200 switch in the ring, the transmission path is reconfigured within 200 ms.

With the C-PLUG swap medium, devices can be exchanged without a programming device; the configuration or application data are secured on the C-PLUG and can be implemented in another SCALANCE X-200 switch without special know-how.

Based on PROFINET, the switches of the SCALANCE X-200 product line can be easily integrated into the process and system diagnostics.

The SCALANCE X-200 switches are available in electrical and electrical/optical versions:

- SCALANCE X208 with eight electrical ports
- SCALANCE X204-2/X204-2LD with four electrical and two optical ports (BFOC)
- SCALANCE X206-1/X206-1LD with six electrical and one optical port (BFOC)
- SCALANCE X212-2/X212-2LD with 12 electrical and two optical ports (BFOC)
- SCALANCE X216 with 16 electrical ports
- SCALANCE X224 with 24 electrical ports

SCALANCE X Industrial Ethernet switches

SCALANCE X-200 managed/SCALANCE XF-200 managed

SCALANCE X-200PRO managed



Thanks to its rugged design, the SCALANCE X-200PRO Industrial Ethernet switch with IP65 degree of protection allows the setup of a star network topology outside the control cabinet. If needed, the network can be powered by 24 V DC, or with 230 V AC using the PS791-1PRO power supply.

PROFINET diagnostics can also be carried out with the SCALANCE X-200PRO.

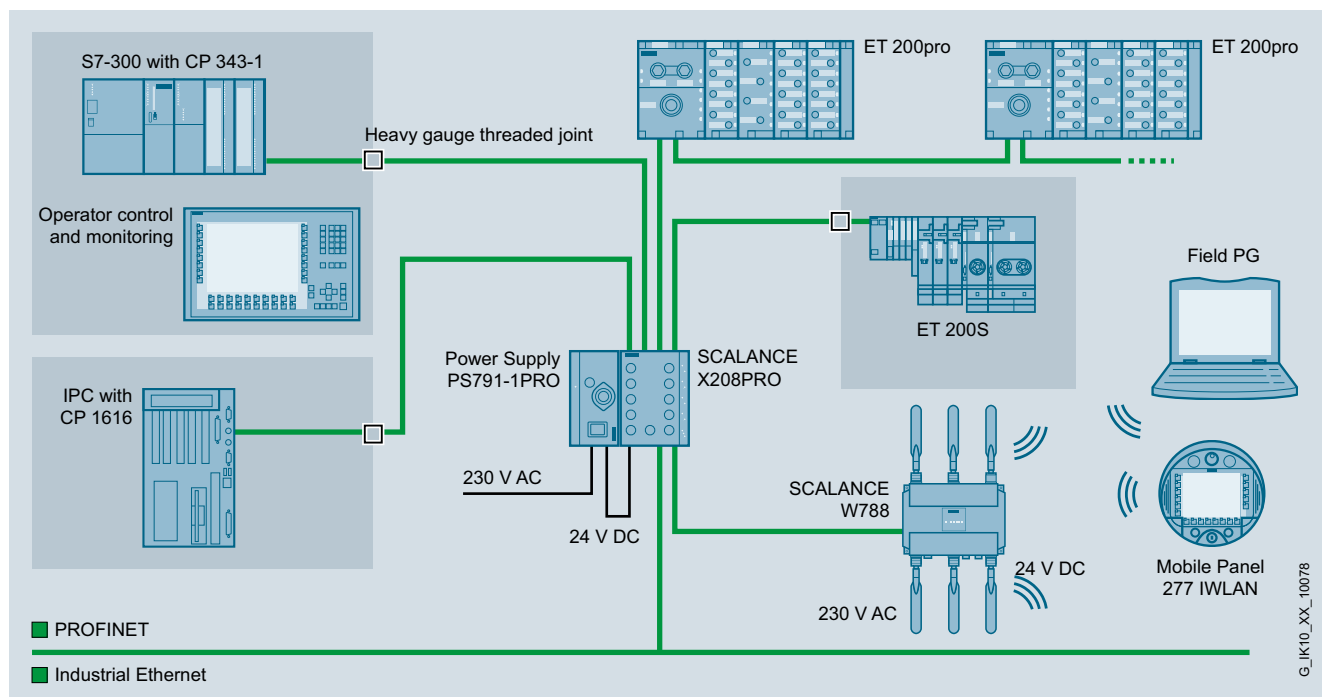
- SCALANCE X208PRO with eight electrical ports

SCALANCE XF-200 managed

The SCALANCE XF-200 switches have an extra-flat design. These industry-standard units with IP20 degree of protection and special port arrangement with angled cable outlet allows easy installation of the switches in the control cabinet or control box. In addition, they offer an integrated redundancy manager function, which allows the network to be reestablished within milliseconds following a fault.

The SCALANCE XF-200 switches are available in electrical and electrical/optical versions:

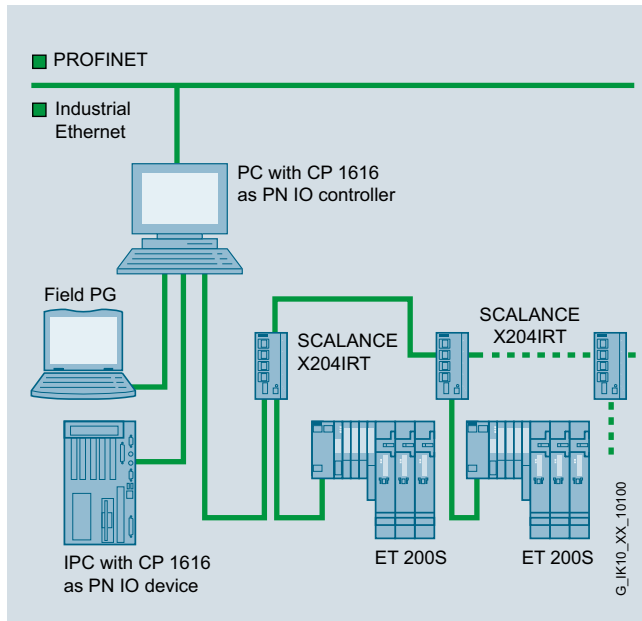
- SCALANCE XF204 with four electrical ports
- SCALANCE XF208 with eight electrical ports
- SCALANCE XF204-2 with four electrical and two optical ports (BFOC)
- SCALANCE XF206-1 with six electrical ports and one optical port (BFOC)



Configuration for cabinet-free setup with SCALANCE X208PRO with IP65 degree of protection

SCALANCE X-200IRT managed/SCALANCE XF-200IRT managed

SCALANCE X-200IRT managed



Configuration example for SCALANCE X204IRT

With the versions SCALANCE X-200IRT, real time and isochronous real time networks can be set up. As a result, one network is available for hard real-time and standard data transmission (TCP/IP), preventing the need for a double infrastructure.

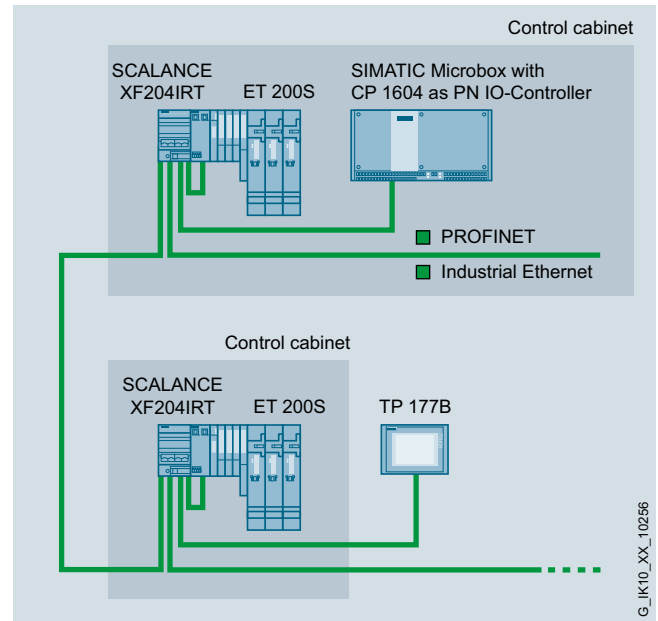
Redundant ring topologies can be set up and two sub-networks, e.g. rings, can be connected redundantly via the SCALANCE X-200IRT switches (standby function).

On the failure of a transmission link or a SCALANCE X-200 switch in the ring, the transmission path is reconfigured within 200 ms.

The SCALANCE X-200IRT switches are available as electrical and electrical/optical versions with degrees of protection IP30 and IP65:

- SCALANCE X204IRT/X204IRT PRO with four electrical ports
- SCALANCE X201-3P IRT/X201-3P IRT PRO with one electrical port and three optical ports (POF/PCF)
- SCALANCE X200-4P IRT with four optical ports (POF/PCF)
- SCALANCE X202-2IRT/X202-2P IRT/X202-2P IRT PRO with two electrical and two optical ports (BFOC or POF/PCF)

SCALANCE XF-200IRT managed



Use of SCALANCE XF-200/XF-200IRT in slim control boxes

Thanks to the advantages of its slim design, the SCALANCE XF-204IRT switch allows the setup of real-time and isochronous real-time networks. As a result, one network is available for hard real-time and standard data transmission (TCP/IP), preventing the need for a double infrastructure.

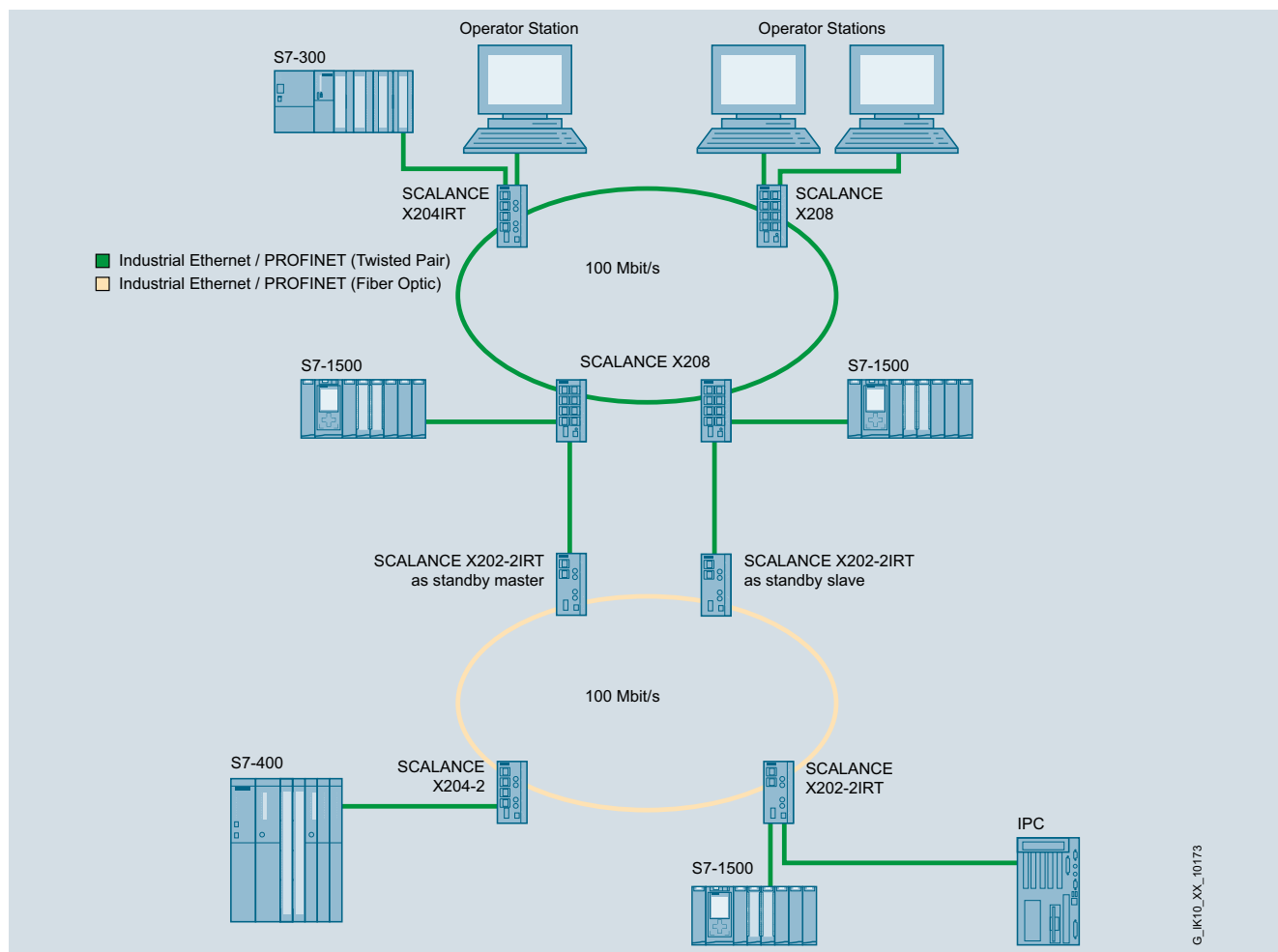
Redundant ring topologies can be set up and two subnets, e.g. rings, can be connected redundantly (standby function).

Fast Start-Up

In modern manufacturing applications, the installed robots use different tools depending on the task. For this, a fast power-up of the components on the robot tools is necessary. The power-up behavior (link building, data forwarding) of PROFINET network components and I/O devices has been optimized with the new Fast Start-Up (FSU) functionality. Depending on the peripheral devices used, the start-up can occur within 500 ms after power is applied and the components are included in the data exchange. The demand for very short cycle times in production is met not only by PROFINET IO controllers and I/O devices, but also by SCALANCE X switches with integrated ERTEC and IRT functionality.

SCALANCE X Industrial Ethernet switches

SCALANCE X-200IRT managed/SCALANCE XF-200IRT managed

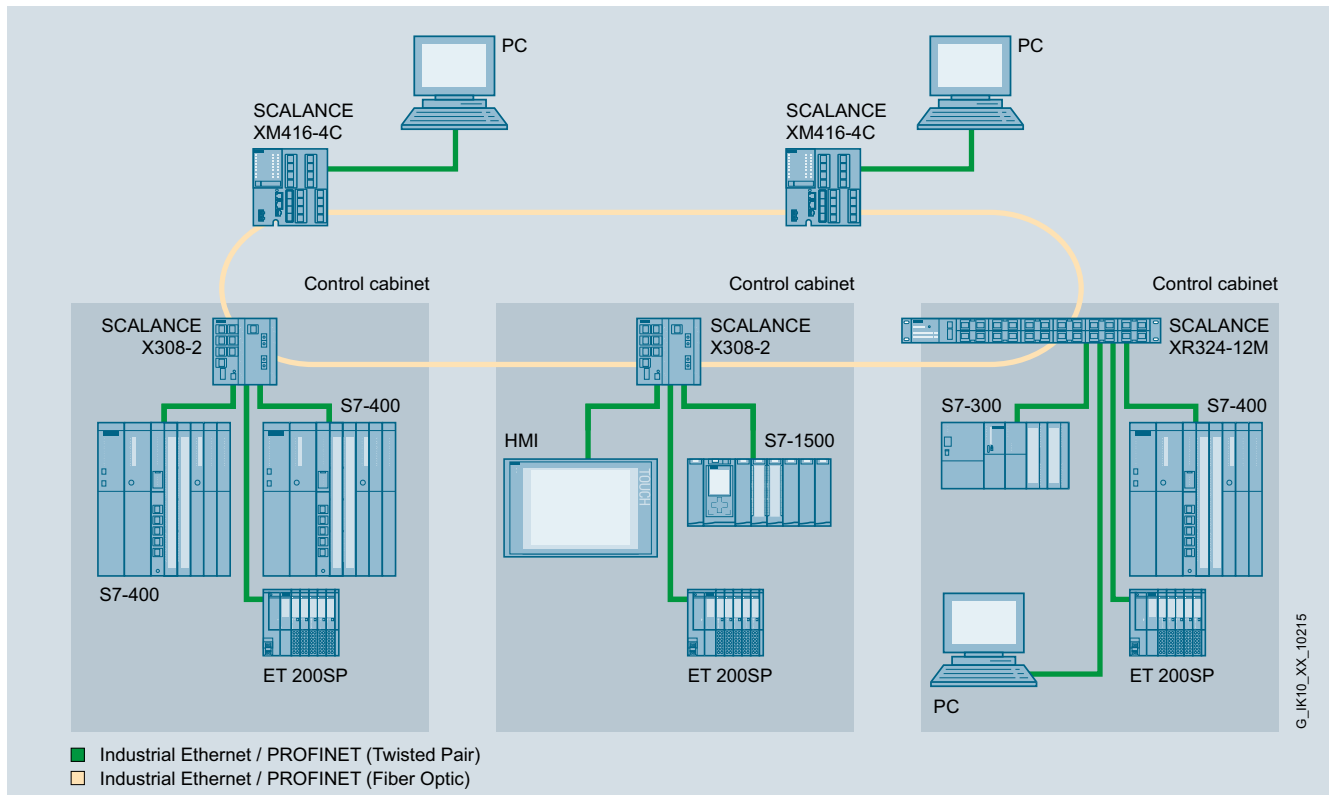


Redundant coupling of two subnets with SCALANCE X-200IRT

Properties at a glance

- Fast Start-Up for optimized start-up behavior (link building, data forwarding) of PROFINET network components and I/O devices
- Diagnostics on the device by means of LEDs (power, link status, data communication) and signaling contact (signaling mask can be set on site using buttons)
- Redundant power supply
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Integrated redundancy manager for constructing Fast Ethernet ring topologies with high-speed media redundancy.
- Automatic detection and negotiation of the data transmission rate by means of autosensing and auto-negotiation function
- Remote diagnostics is performed by means of SNMP, web browser and PROFINET IO diagnostics
- Integrated configuration and diagnostics in STEP 7
- Integration of the switches in existing network management infrastructure by means of SNMP access
- Automatic e-mail sending function
- C-PLUG swap medium for rapid replacement of devices

SCALANCE X-300 managed



Integration of control cabinets with SCALANCE X-300 in an optical Gigabit ring

The compact Gigabit switches of the SCALANCE X-300 product range are Industrial Ethernet switches for setting up line, star, and ring topologies (10/100/1000 Mbps) for high-performance networks. They enable the construction of optical and/or electrical networks with high network availability, since, for example, they enable ring redundancy in combination with a redundancy manager function and have a redundant power supply.

With the C-PLUG swap medium, devices can be exchanged without programming device; the configuration or application data are secured on the C-PLUG and can be implemented in another SCALANCE X-300 switch without special expertise.

The gigabit ports are typically used for connecting the switches to each other and for a possible connection to higher network levels.

The following network topologies and combinations of topologies are possible:

- Fast Ethernet and Gigabit Ethernet rings with fast media redundancy. To protect against failure of a transmission link or a switch, as many as 50 SCALANCE X-300 switches cascaded in line can be connected into a ring. On the failure of a transmission link or a SCALANCE X-300 switch in the ring, the transmission path is reconfigured within 200 ms
- Redundant connection of the ring topology to the corporate network using Rapid Spanning Tree Protocol (RSTP)
- Redundant linking of subnets, e.g. ring topologies (standby redundancy)
- Star topology with SCALANCE X-300 switches: Each SCALANCE X-300 switch represents a star point which can interconnect nodes or subnets electrically or optically
- Problem-free connection of existing twisted-pair terminal devices or existing network segments at 10/100/1000 Mbps
- High availability of the network thanks to
 - Redundant power supply
 - Redundant network structures based on fiber-optic or twisted pair cables

SCALANCE X Industrial Ethernet switches

SCALANCE X-300 managed

Switches with Fast Ethernet and Gigabit Ethernet ports

SCALANCE X310

- Three Gigabit ports
- Seven Fast Ethernet ports

SCALANCE X308-2

- Two optical Gigabit ports (SC multimode, up to 750 m)
- One electrical Gigabit port (RJ45)
- Seven Fast Ethernet ports

SCALANCE X308-2LD

- Two optical Gigabit ports (SC singlemode, up to 10 km)
- One electrical Gigabit port (RJ45)
- Seven Fast Ethernet ports

SCALANCE X308-2LH / SCALANCE X308-2LH+

- Two optical Gigabit ports (SC singlemode)
 - SCALANCE X308-2LH: Up to 40 km
 - SCALANCE X308-2LH+: Up to 70 km
- One electrical Gigabit port (RJ45)
- Seven Fast Ethernet ports

SCALANCE X307-3 / SCALANCE X307-3LD

- Three optical Gigabit ports (SC multimode)
 - SCALANCE X307-3: Up to 750 m
 - SCALANCE X307-3LD: Up to 10 km
- Seven Fast Ethernet ports

Fast Ethernet switches

SCALANCE X310FE

- Ten electrical Fast Ethernet ports

SCALANCE X306-1LD FE

- Six electrical Fast Ethernet ports
- One optical port (SC, singlemode, up to 26 km)

SCALANCE X320-1FE

- Twenty electrical Fast Ethernet ports
- One optical port (SC, multimode, up to 5 km)

SCALANCE X320-3LD FE

- Twenty electrical Fast Ethernet ports
- Three optical ports (SC, multimode, up to 5 km)

Full Gigabit Ethernet switches

SCALANCE X308-2M

- Four electrical Gigabit ports
- Two free module slots for 4 x 10/100/1000 Mbps media modules (electrical or optical)

SCALANCE X308-2M TS (Transportation Systems)

- Four electrical Gigabit ports
- Two free module slots for 4 x 10/100/1000 Mbps media modules (electrical or optical)
- Suitable for use in railroad applications in accordance with EN 50155



SCALANCE XR-300 managed

The SCALANCE XR-300 is an industry-standard Industrial Ethernet 19" rack switch with IP20 degree of protection that features IT functions such as VLAN, IGMP Snooping/Querier or STP/RSTP.

The main application areas for the SCALANCE XR-300 switches are high-performance plant networks with a connection to the enterprise network, as well as power distribution centers. Thanks to the compact, space-saving 19" design, the SCALANCE XR-300 can be installed in 19" control cabinets.

SCALANCE XR-300 switches permit the configuration of switched networks at the field level and control level, which not only demand high availability of the network and extensive diagnostic options, but also high transmission rates.

The use of media modules supports unlimited flexibility in expansion (e.g. more terminal devices) or conversion of the network (e.g. conversion from copper to fiber-optic conductors).

SCALANCE XR324-12M or XR324-12M TS (12 media modules)

Optical Industrial Ethernet line, ring or star topologies are constructed using the SCALANCE XR324-12M or XR324-12M TS (transportation system) switches with 24 ports, of which 12 are media module slots.

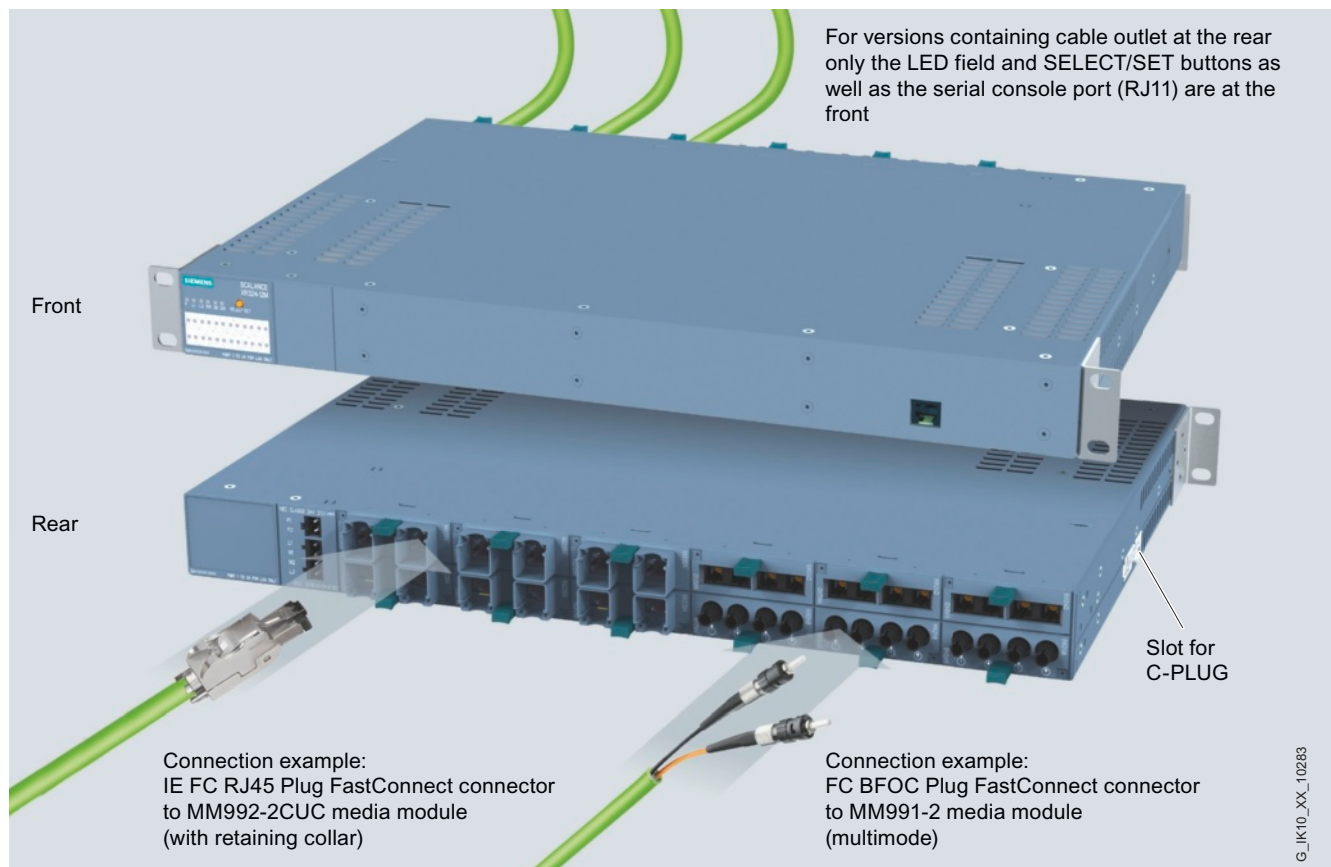
The switches can be equipped with electrical and/or optical 2-port media modules. Media modules with coated PCBs are also suitable for railway applications and correspond to the requirements of EN 50155.

Space is also saved in the control cabinet due to the flexible cable outlet on the front or rear of the device.

LEDs, connections for the power supply and data cable outlet are installed – depending on the device variant – on the front or rear.

The power supply is alternatively from

- 1 x 24 V DC power supply unit
- 1 x 110 to 230 V AC power supply unit



SCALANCE XR-300 with data cable outlet at rear

SCALANCE X Industrial Ethernet switches

SCALANCE X-300 managed

SCALANCE X-300PoE / XR-300PoE managed

The SCALANCE X-300PoE product line for constructing electrical and/or optical line, star and ring topologies operating at 10/100/1000 Mbps has the functionality of SCALANCE X-300.

SCALANCE X308-2M PoE

Compact Industrial Ethernet switch with

- Four RJ45 ports incl. Power-over-Ethernet functionality (according to IEEE 802.3at Type 1, corresponding to IEEE 802.3af) for the supply of power to terminal devices (up to 15 W each)
- Two slots for any type of 2-port media module

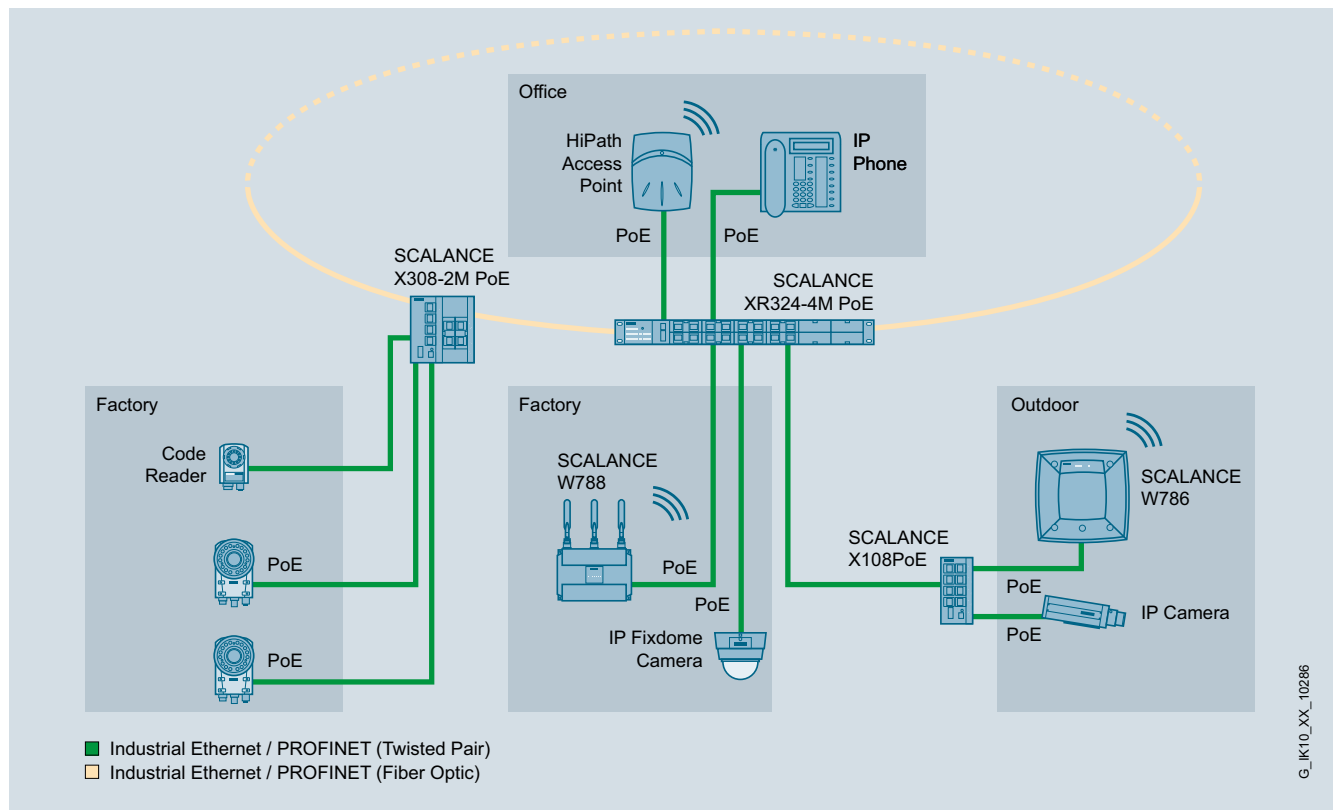
SCALANCE XR324-4M PoE or XR324-4M PoE TS

19" Industrial Ethernet switches with

- Eight permanently integrated RJ45 ports incl. Power-over-Ethernet functionality (according to IEEE 802.3at Type 1, corresponding to IEEE 802.3af) for the supply of power to terminal devices (up to 15 W each)
- Eight permanently integrated RJ45 ports without Power-over-Ethernet functionality
- Four slots for any type of 2-port media module

The modularity offered by the use of media modules enables the network to be perfectly adapted to the application. This means that a network can be easily expanded or converted, e.g. to Gigabit Ethernet or from multimode to singlemode fiber-optic cables. The versions for transportation systems correspond to the requirements of EN 50155.

The SCALANCE X308-2M PoE and XR-300PoE switches supply PoE-compatible devices, such as WLAN access points SCALANCE W, IP cameras or IP telephones, with energy over the data cable and are suitable for constructing electrical and/or optical Industrial Ethernet line, star or ring topologies.



Supply of terminal devices with Power-over-Ethernet by means of PoE-compatible switches

SCALANCE X-300EEC/XR-300EEC managed

The switches of the SCALANCE X-300EEC/XR-300EEC (Enhanced Environmental Conditions) product line are managed Industrial Ethernet switches with degree of protection IP30 or IP20. They are designed for use in harsh industrial environments as well as in power switchgear, for example. They permit the communication of switching and protection devices in low-voltage and high-voltage switchgear. The switches meet all the necessary EMC approvals for this field of application (IEC standard 61850-3). The devices for increased availability requirements are offered with redundant wide-range power supplies (for 60 V to 250 V DC / 100 V to 240 V AC). SCALANCE X-300EEC switches with conformal coating can also be used in harsh environments.

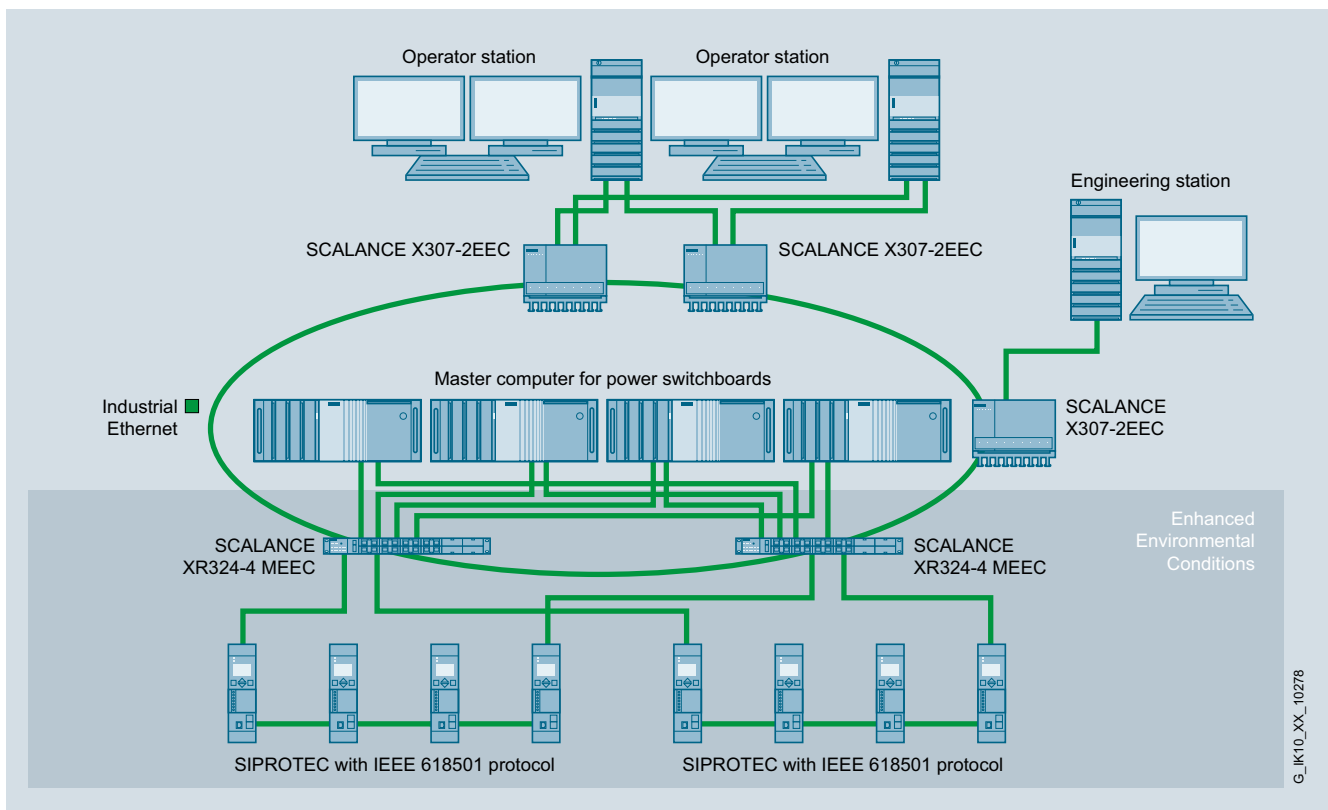
SCALANCE X307-2EEC and SCALANCE X302-7EEC compact devices

- Seven electrical (RJ45) and two optical (LC) ports
- Seven optical and two electrical ports

Modular 19" rack device SCALANCE XR324-4M EEC (four media module slots)

- 16 electrical (RJ45) ports
- Eight modular ports which can be equipped with 2-port media modules

The SCALANCE XR324-4M EEC is available with front or rear cable outlet. In the version with rear cable outlet, the cables are located in the back of the control cabinet and the devices can be diagnosed by means of LEDs on the front. As a star coupler in the plant bus (redundant connection possible), it is designed specifically for use in power distribution plants.



Use of SCALANCE X-300EEC and XR-300EEC in power switchgear

SCALANCE X Industrial Ethernet switches

SCALANCE X-300 managed

Properties at a glance

- Simple adaptation to the structure of a plant thanks to the modularity offered by 2-port media modules
- Diagnostics on the device by means of LEDs (power, link status, data communication) and signaling contact (signaling mask can be set on site using buttons)
- Redundant power supply
- Reduction of the network installation costs due to savings in power cables and additional network components when Power-over-Ethernet is used
- High flexibility thanks to variable mounting options of the power supply unit, and choice between front or rear cable outlet on the device (depending on the device variant)
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function
- Remote diagnostics is performed by means of SNMP, web browser and PROFINET IO diagnostics
- Integrated configuration and diagnostics in STEP 7
- Integrated redundancy manager for constructing Fast Ethernet and Gigabit Ethernet ring topologies with high-speed media redundancy
- Integration of the switches in existing network management infrastructure by means of SNMP access
- Automatic e-mail sending function
- C-PLUG swap medium for rapid replacement of devices
- Multicast and broadcast limitation
- Support of VLAN permits integration into enterprise security policies
- IGMP Snooping and IGMP Query support Multicast filtering and limiting



Media modules for modular SCALANCE X-300 managed switches

Different 2-port media modules support versatile configuration of the partly and fully modular switches

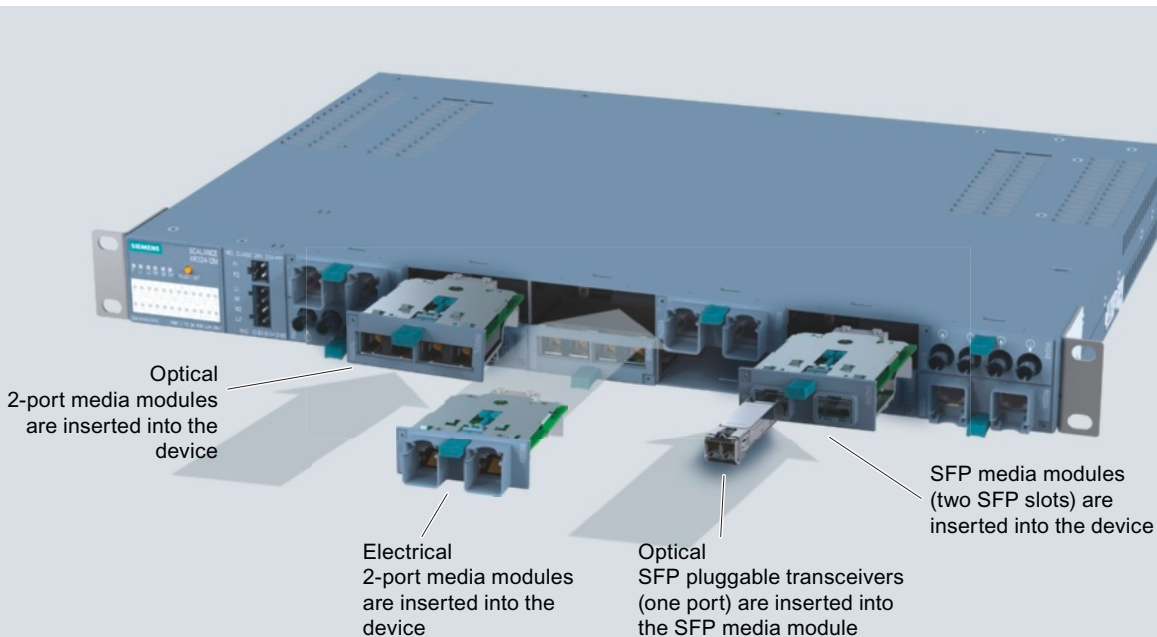
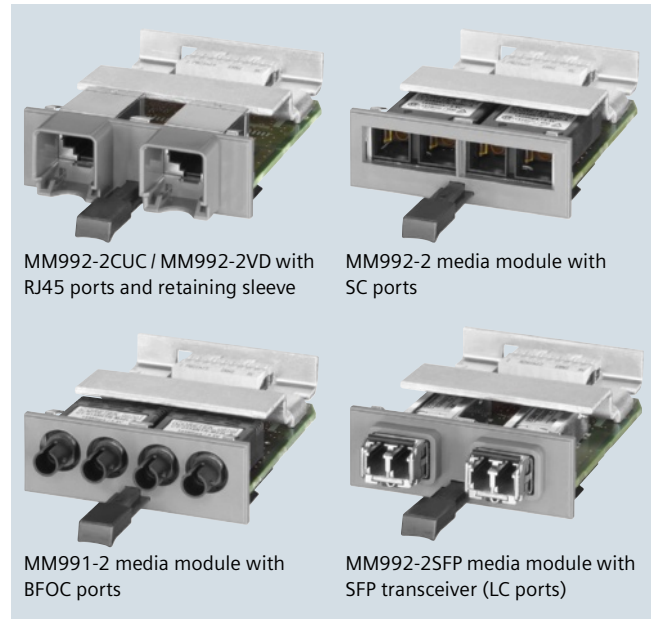
- SCALANCE X308-2M/X308-2M TS/X308-2M PoE and
- SCALANCE XR-300/XR-300PoE/XR-300EEC

The media modules are available both as electrical versions with RJ45 ports and as optical versions with BFOC, SC and LC ports for the use of multimode and singlemode fiber-optic cables.

The media modules with coated PCBs (conformal coating) are also available for railway applications. In addition, the media module MM992-2VD (variable distance) enables the transmission of Industrial Ethernet data message frames via existing 2-wire cables.

Using a 2-port SFP media module (Small Form-Factor Pluggable) the optional use of fiber optic SFP plug-in transceivers with LC connection technology is possible.

Their versatility (electrical/optical, multimode/singlemode, Fast Ethernet, Gigabit Ethernet) with media modules which can be differently equipped allows significantly reduced stocking of device variants.



Insertion of 2-port media modules in media module slot

SCALANCE X Industrial Ethernet switches

SCALANCE X-400 managed (layer 3)

The modular switches of the SCALANCE XM-400 product range are Industrial Ethernet switches for setting up line, star, and ring topologies (10/100/1000 Mbps) for high-performance networks. The SCALANCE XM-400 switches are highly suitable for higher-level hall networks, building control systems and infrastructures, central control rooms and stations, and transportation, for example in tunnel projects.

The SCALANCE XM-400 switches allow flexible setup of optical or electrical networks which can be adapted in their topology, port number, and port type to the respective network structures. They allow high network availability, for example because they enable ring redundancy in combination with a redundancy manager function, have a redundant power supply, or allow the exchange and expansion of extender modules during operation.

SCALANCE XM-400 switches offer

- A modular structure in which extender modules can be inserted in the switch as required. These expansions make as many as 24 electrical and 8 optical ports additionally available
- Comboports as alternative use of the electrical or optical ports depending on requirements
- Ports which are all gigabit; they can be typically used for connecting the switches to each other and for a possible connection to higher network levels
- The NFC function (Near Field Communication); fast access to the web-based management of the SCALANCE XM-400 via mobile websites. The function can be started with WLAN and an NFC-compatible smart phone or tablet
- Layer 3 functions such as VLAN, real-time communication via PROFINET, diagnostics functions or ring redundancy; they can be enabled with the KEY-PLUG optional routing swap medium with more than 4000 hardware routes and 127 routing interfaces
- The C-PLUG swap medium; devices can then be exchanged without a programming device; the configuration or application data is saved on the C-PLUG and can be implemented in another SCALANCE XM-400 switch without special know-how



Product versions

SCALANCE XM-400 basic devices:

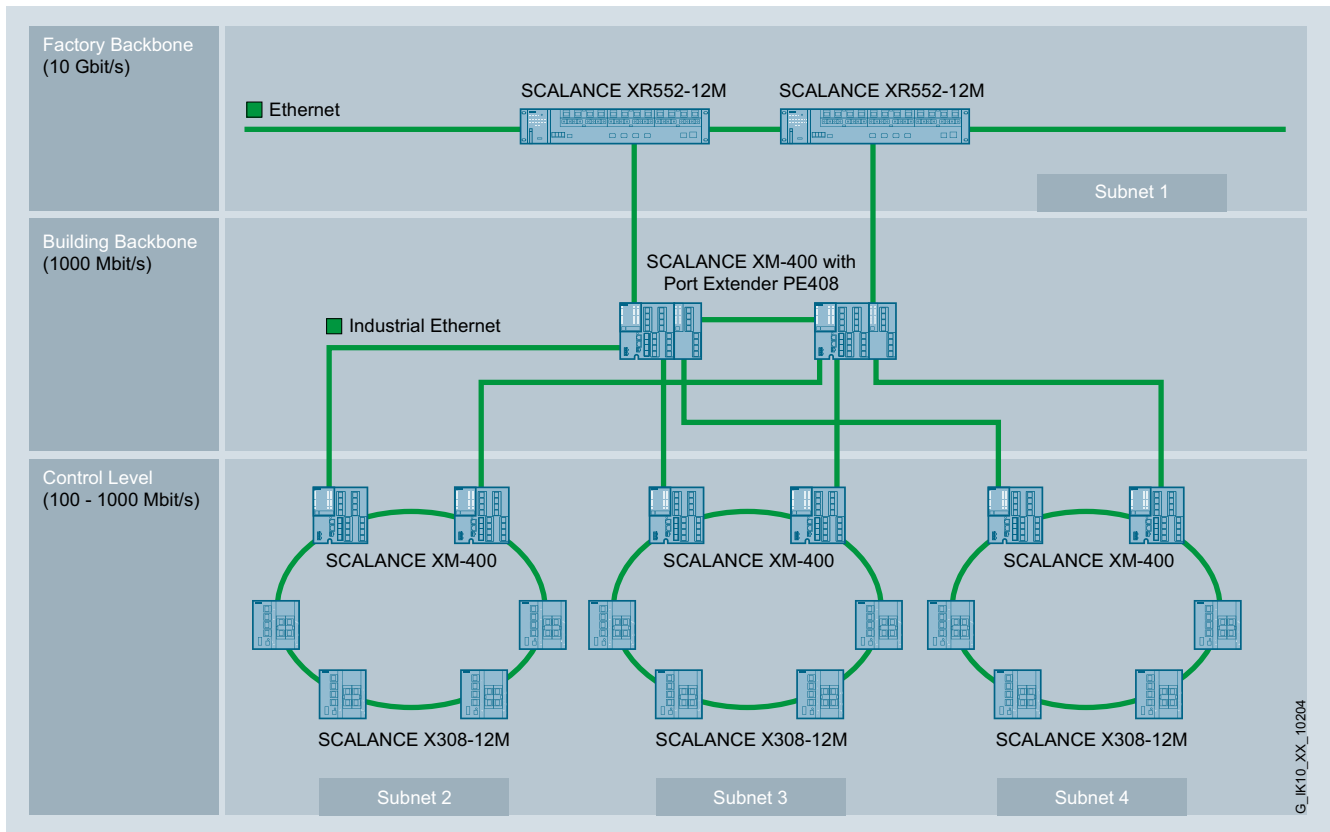
- SCALANCE XM416-4C
16x RJ45 ports
4x SFP ports as comboports (16 active ports)
- SCALANCE XM408-8C
8x RJ45 ports
8x SFP ports as comboports (8 active ports)
- SCALANCE XM404-8PoE*
4x RJ45 ports
8x SFP ports as comboports with Power-over-Ethernet (8 active ports)

SCALANCE XM-400 extender modules:

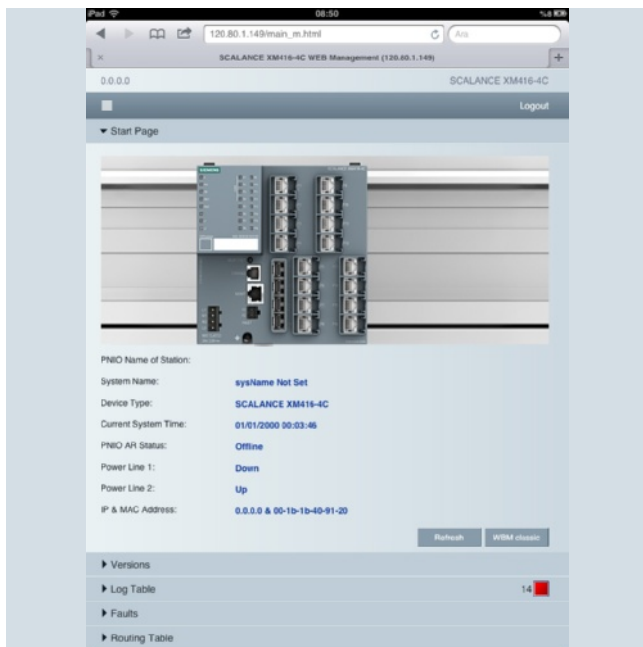
- PE408 port extender with eight additional RJ45 ports
- PE400-8SFP port extender with eight additional slots for SFP plug-in transceivers, optionally for 1 GE SFP transceiver
- PE408PoE port extender* with eight RJ45 ports with Power-over-Ethernet

A maximum of 24 ports can be operated.

* Available soon



Configuration of a network with SCALANCE XM-400



Mobile website of SCALANCE XM-400

SCALANCE X Industrial Ethernet switches

SCALANCE X-400 managed (layer 3)

Properties at a glance

- Simple adaptation to the structure of a plant thanks to the modularity offered by port extenders
- Diagnostics on the device by means of LEDs (power, link status, data communication) and signaling contact (signaling mask can be set on site using buttons)
- High availability of the network thanks to
 - Redundant power supply
 - Integrated redundancy manager for constructing Fast Ethernet and Gigabit Ethernet ring topologies with high-speed media redundancy
 - Easy device replacement by means of plug-in C-PLUG/KEY-PLUG swap medium
 - Very fast reconfiguration of the network in event of a fault
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Comboports as alternative use of the electrical or optical ports depending on requirements
- NFC (Near Field Communication) for fast reading-out of data onto a smart phone or tablet for easy monitoring and diagnostics of the device and network
- Space-saving SIMATIC S7-1500 design
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function
- Remote diagnostics is performed by means of SNMP, web browser and PROFINET IO diagnostics
- High flexibility due to variable installation options
- Integrated redundancy manager for constructing Fast Ethernet and Gigabit Ethernet ring topologies with high-speed media redundancy
- Integrated configuration and diagnostics in the TIA Portal
- Integration of the switches in existing network management infrastructure by means of SNMP access
- Automatic e-mail sending function
- Multicast and broadcast limitation
- Support of VLAN permits integration into enterprise security policies
- IGMP Snooping and IGMP Query support Multicast filtering and limiting
- Optional layer 3 functionality can be activated via KEY-PLUG XM-400
- Use in all Industrial Ethernet networks based on the IEEE 802.3 standard



SCALANCE X-500 managed (layer 3)

SCALANCE X-500 switches are fully modular, high-performance, and industry-standard switches for the construction of electrical and optical line, ring and star topologies with transfer rates of up to 10 Gbps, designed for installation in 19" control cabinets.

The SCALANCE X-500 switches are ideal for use in industrial networks and for integrating the industrial network into an existing corporate network. From the control level to the management level, the switch handles the networking of plant sections as well as distributed field devices and ensures high plant availability with extensive diagnostics options and high transmission speeds.

The KEY-PLUG swap medium activates layer 3 switching functions, and is able like the C-PLUG to save configuration data (easier device replacement in event of fault).

The SCALANCE X-500 switches are suitable for setting up electrical and optical Industrial Ethernet line, star and ring topologies, and they are available with the following port types for multimode or singlemode connections:

- Four SFP+ slots for optical SFP+ or SFP plug-in transceivers
 - The SFP+ plug-in transceivers support 10 Gbps
 - The SFP plug-in transceivers support 1000 Mbps
- Up to 12 slots for electrical 4-port media modules, electrical PoE 4-port media modules and optical 4-port media modules (with different connection methods);
 - For industrial applications, the RJ45 sockets are also available with additional retaining sleeve for connection of the Industrial Ethernet FC RJ45 Plug 180
 - All electrical Ethernet interfaces support 10/100/1000 Mbps, all optical Ethernet interfaces support 100 or 1000 Mbps.

The use of media modules or SFP+/SFP enables the following:

- Extension of networks by subsequent insertion of additional media modules in unused media module slots
- Changing of cabling technology, such as conversion from copper to fiber-optic cables, or from multimode to single-mode FOC
- Changing of the transfer rate, e.g. from 1000 Mbps to 10 Gbps



Product versions

SCALANCE XR552-12M

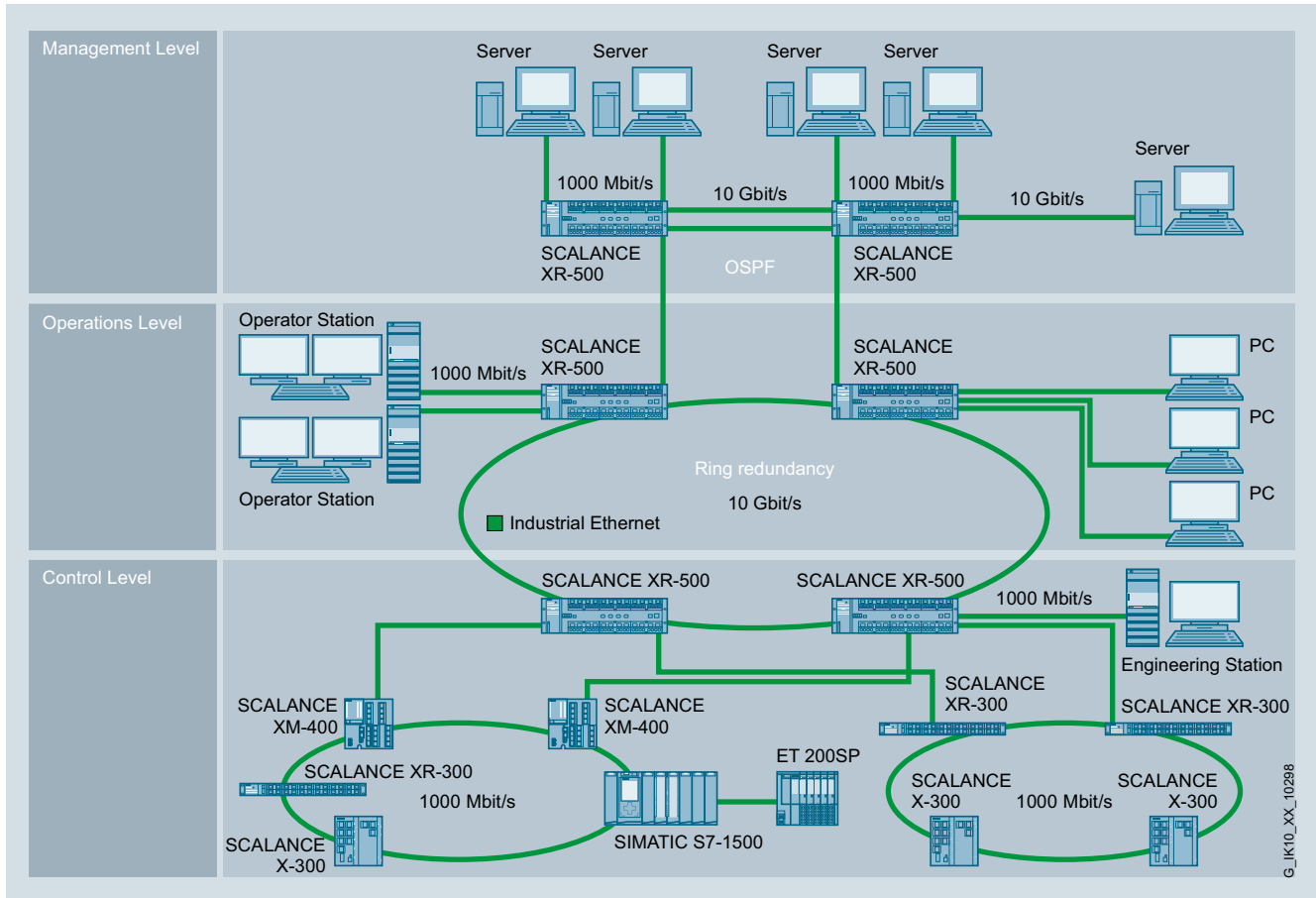
- LEDs and data cable outlet on the front
- Alternatively: LEDs on the front and data cable outlet at the rear
- Connection of power supply unit at rear or above/below the switch
- Four SFP+ slots for equipping with 10 Gigabit Ethernet SFP+ plug-in transceivers or Gigabit SFP plug-in transceivers
- 12x 4-port media module slots

SCALANCE XR528-6M

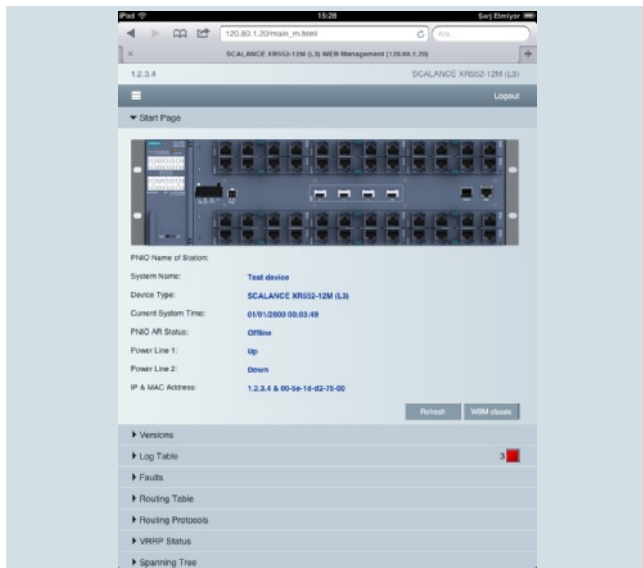
- LEDs and data cable outlet on the front
- Alternatively: LEDs on the front and data cable outlet at the rear
- Connection of power supply unit at rear or above/below the switch
- Four SFP+ slots for equipping with 10 Gigabit Ethernet SFP+ plug-in transceivers or Gigabit SFP plug-in transceivers
- 6x 4-port media module slots

SCALANCE X Industrial Ethernet switches

SCALANCE X-500 managed (layer 3)



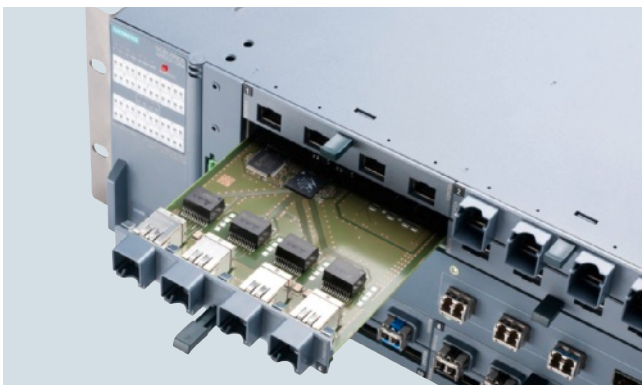
Use of SCALANCE XR-500 in redundant network topologies, e.g. with Rapid Spanning Tree Protocol (RSTP) and ring redundancy



Mobile website of SCALANCE X-500

Properties at a glance

- Simple adaptation to the structure of a plant thanks to the modularity offered by 4-port media modules
- Diagnostics on the device by means of LEDs (power, link status, data communication) and signaling contact (signaling mask can be set on site using buttons)
- High availability of the network thanks to
 - Redundant power supply
 - Integrated redundancy manager for constructing Fast Ethernet and Gigabit Ethernet ring topologies with high-speed media redundancy
 - Easy device replacement by means of plug-in C-PLUG/KEY-PLUG swap medium
 - Very fast reconfiguration of the network in event of a fault
- KEY-PLUG swap medium for optional layer 3 functionality during operation
- Thanks to support for the Dual Stack Routing function, both IPv4 and IPv6 addressing can be operated in one network
- High flexibility thanks to variable mounting options of the power supply unit, and choice between front or rear cable outlet on the device (depending on the device variant)
- Reduction of the network installation costs due to savings in power cables and additional network components when Power-over-Ethernet is used
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function
- Remote diagnostics is performed by means of SNMP, web browser and PROFINET IO diagnostics
- Integrated configuration and diagnostics in the TIA Portal
- Integration of the switches in existing network management infrastructure by means of SNMP access
- Automatic e-mail sending function
- Multicast and broadcast limitation
- Support of VLAN permits integration into enterprise security policies
- IGMP Snooping and IGMP Query support Multicast filtering and limiting



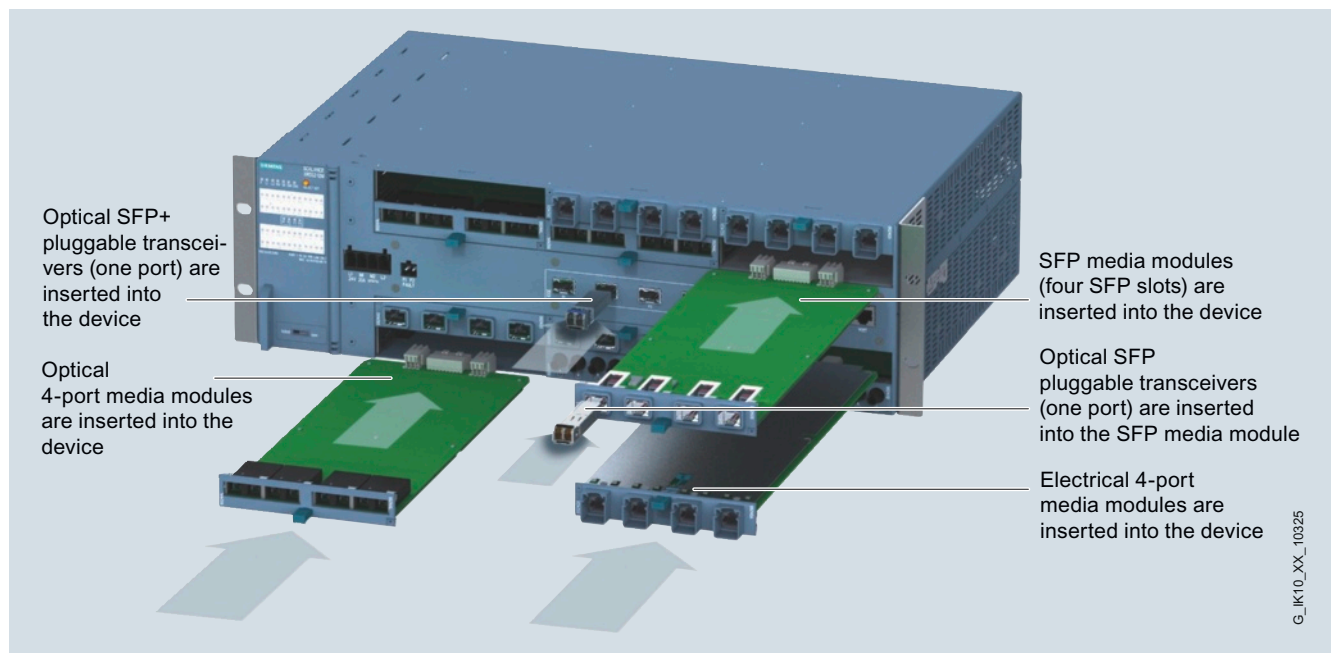
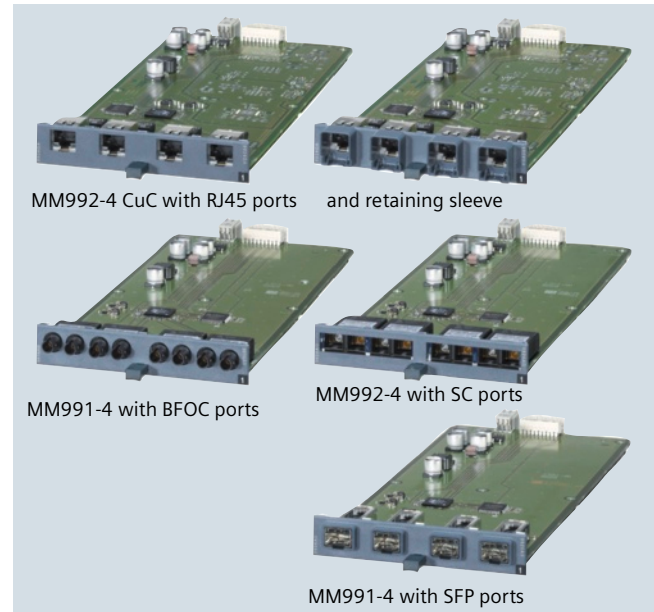
SCALANCE X Industrial Ethernet switches

Media modules for modular SCALANCE X-500 managed switches

Different 4-port media modules enable flexible equipping of the SCALANCE X-500 switches. Electrical versions with RJ45 ports are available as well as optical versions with BFOC and SC ports for the use of multimode and singlemode fiber-optic cables.

- Using a 4-port SFP media module, the optional use of fiber-optic SFP plug-in transceivers (Small Form-Factor Pluggable) with LC connection technology is possible
- SFP+ and SFP plug-in transceivers for flexible equipping of the four integral SFP+ slots in SCALANCE X-500

Their versatility (electrical/optical, multimode/singlemode, Fast Ethernet, Gigabit Ethernet) with media modules which can be differently equipped allows significantly reduced stocking of device variants.



4-port media modules plugged into media module slot and SFP/SFP+ plug-in transceivers in SFP+ slots



SCALANCE X accessories

PLUGs for network components

With the KEY-PLUG and C-PLUG swap media, it is possible to enable special additional functions for various network components. KEY-PLUG contains all the functionalities of C-PLUG.

There are PLUGs for SCALANCE X, SCALANCE W, SCALANCE S, communication processors and also network transitions.

- C-PLUG allows, for example, fast and simple device replacement in the case of a fault and is used for automatic backup of configuration data
- The KEY-PLUG for IWLAN activates so-called iFeatures with SCALANCE W network components, e.g. wireless real-time communication, fast roaming, and extended range
- The KEY-PLUGs for SCALANCE XM-400 and X-500 enable the layer 3 functionality on all layer 2 devices

KEY-PLUG		C-PLUG				
						
SCALANCE W (IEEE 802.11n)	SCALANCE X	SCALANCE W (IEEE 802.11agbn)	SCALANCE X	SCALANCE S	SIMATIC S7	Network transitions
SCALANCE W74x	SCALANCE X-500	SCALANCE W74x	SCALANCE X-200	SCALANCE S-600*	CP 443-1 Advanced*	IWLAN/PB Link PN IO
SCALANCE W78x	SCALANCE XM-400	SCALANCE W78x	SCALANCE X-300*		CP 343-1 Advanced*	IE/PB Link PN IO
			SCALANCE XM-400/ X-400*		CP 343-1 ERPC*	IE/AS-i LINK PN IO
			SCALANCE X-500*			DP/AS-i LINK Advanced

* included in scope of delivery

Advantages

- Functional expansions of network components without device replacement
- Minimization of downtimes when faults occur
- No specialized personnel required for device replacement



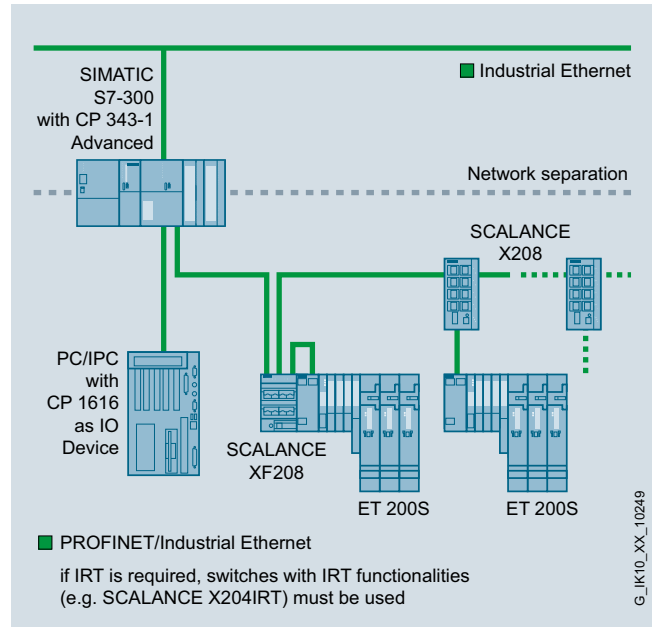
Industrial Ethernet Switching

Communications processors with switch functionality

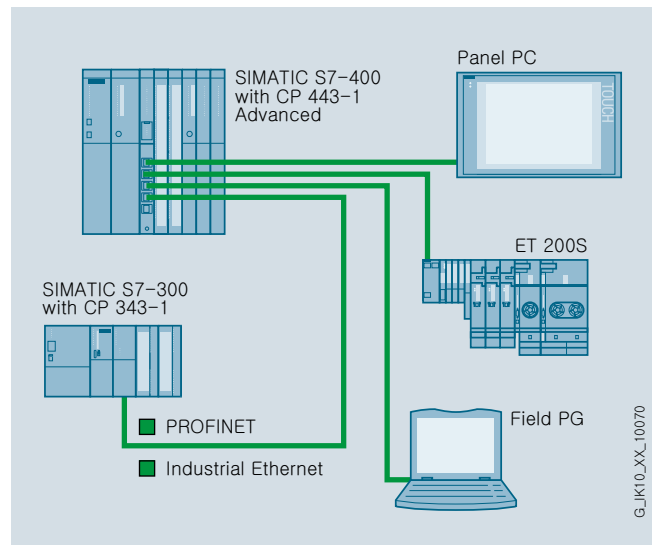
Generally, communications processors are used to connect SIMATIC S7 or PCs to PROFIBUS or Industrial Ethernet. The CPs perform communication tasks for the controllers and take up few of their resources. Some communications processors also have an integral switch, which offers additional benefits.

- Establishment of small networks without additional switch
- Connection of machines or process cells to higher-level networks
- Network separation by means of layer 3 functionality (IP routing) and Security Integrated (firewall, VPN) with CP 343-1 Advanced, CP 443-1 Advanced, and CM 1542-1 with PROFINET
- Functions for network diagnostics

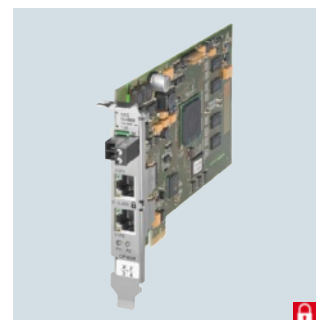
In this case, suitable protective measures (including IT security such as network segmentation) should be taken in order to ensure safe operation of the plant. For more information on the topic of industrial security, go to www.siemens.com/industrialsecurity.



Connection to higher-level network



Independent local networks, e.g. within a machine or cell



Communications processors with switch functionality

The SIMATIC NET communications processors can be used for applications in factory and process automation. With their protocol pre-processing, they offer constant data throughput, enable consistently fast response times, and prevent fluctuations in communication performance.

The communication processors are all designed for use in tough industrial environments with a wide range of temperatures. They are certified for marine use, enabling them to be used in ships or offshore installations.

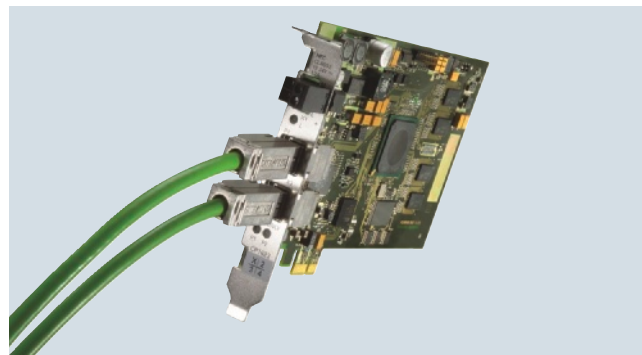
The following communications processors are available with integral switch:

CPs for SIMATIC S7

CP 343-1 Lean, CP 343-1, CP 343-1 Advanced,
CP 443-1, CP 443-1 Advanced, CM 1542-1

Properties at a glance

- Connection to SIMATIC S7 via backplane bus
- Diagnostics on the device by means of LEDs (link status, bus fault, data communication)
- RJ45 sockets with retaining sleeve for additional strain relief, designed for PROFINET-compliant IE FC RJ45 plug
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function
- Remote diagnostics is performed by means of SNMP, Web browser and PROFINET IO diagnostics
- Support of PROFINET IRT for time-critical applications, also with isochronous closed-loop control in the motion control area (except CP 343-1 Lean/CP 343-1)
- Integrated configuration and diagnostics in STEP 7
- Integration of the CPs into existing network management infrastructure by means of SNMP access
- Automatic e-mail sending function (Advanced CPs only)
- IP routing between gigabit and PROFINET interface (Advanced CPs only)



CPs for PCs

CP 1604, CP 1616, CP 1623, CP 1628

Properties at a glance

- Connection in the PC via PCI, PCIe or PC/104-Plus interface
- Redundant voltage supply via PCIe interface and external power supply 12 to 24 V DC for operating the switch when the PC is turned off (CP 1623 and CP 1628 only)
- Integrated autocrossover function makes the use of uncrossed connection cables possible
- Automatic detection and negotiation of the data transmission rate by means of autosensing and autonegotiation function
- Remote diagnostics is performed by means of SNMP and PROFINET IO diagnostics
- Support of PROFINET IRT for time-critical applications also with isochronous closed-loop control in the motion control area (except CP 1623)
- Integrated configuration and diagnostics in STEP 7
- Integration of the CPs into existing network management infrastructure by means of SNMP access
- Support for Gigabit Ethernet (CP 1623 only)
- Security Integrated (Firewall, VPN) with CP 343-1 Advanced, CP 443-1 Advanced, and CP 1628

Industrial Ethernet Switching

Port configuration for SCALANCE X Industrial Ethernet switches and components with switch functionality

	Gigabit Ethernet				Fast Ethernet				Managed Switches
	10 / 100 / 1000 Mbit/s	1 Gbit/s		10 Gbit/s	10 / 100 Mbit/s	100 Mbit/s			
	Electrical	Optical			Electrical	Optical			
Type of module	Twisted Pair	Multimode	Singlemode		Twisted Pair	POF/PCF	Multimode	Singlemode	
XR552-12M ¹⁾	48x RJ45	48x SC/LC	48x SC/LC	4x LC			48x SC/LC/BFOC	48x SC/LC/BFOC	SCALANCE X-500
XR528-6M ¹⁾	24x RJ45	24x SC/LC	24x SC/LC	4x LC			24x SC/LC/BFOC	24x SC/LC/BFOC	
XM416-4C ^{1) 2)}	24x RJ45 ³⁾	20x LC ³⁾	20x LC ³⁾				20x LC ³⁾	20x LC ³⁾	SCALANCE X-400
XM408-8C ^{1) 2)}	24x RJ45 ³⁾	24x LC ³⁾	24x LC ³⁾				24x LC ³⁾	24x LC ³⁾	
XM408-4C ^{1) 2)}	24x RJ45 ³⁾	4x SC/16xLC ³⁾	4x SC/16xLC ³⁾				4x BFOC /16LC ³⁾	4x BFOC /16LC ³⁾	
X302-7EEC ¹⁾	2x RJ45						7x LC		SCALANCE X-300
X304-2FE					4x RJ45			2x SC	
X306-1LD FE					6x RJ45			1x SC	
X307-2EEC ¹⁾	2x RJ45				5x RJ45		2x LC		
X307-3		3x SC			7x RJ45				
X307-3LD			3x SC		7x RJ45				
X308-2	1x RJ45	2x SC			7x RJ45				
X308-2LD	1x RJ45		2x SC		7x RJ45				
X308-2LH	1x RJ45		2x SC		7x RJ45				
X308-2LH+	1x RJ45		2x SC		7x RJ45				
X308-2M ¹⁾	8x RJ45	4x SC/LC	4x SC/LC						
X308-2M TS ¹⁾	8x RJ45	4x SC/LC	4x SC/LC						
X308-2M PoE ¹⁾	8x RJ45	4x SC/LC	4x SC/LC						
X310	3x RJ45				7x RJ45				
X310FE					10x RJ45				
X320-1FE					20x RJ45			1x SC	
X320-3LD FE					20x RJ45		1x SC	1x SC	
XR324-12M ¹⁾ / XR324-12M TS ¹⁾	24x RJ45	24x SC/LC	24x SC/LC		10x RJ45		24x SC/LC/BFOC	24x SC/LC/BFOC	
XR324-4M EEC/ XR324-4M PoE ¹⁾ / XR324-4M PoE TS ¹⁾	24x RJ45	8x SC/LC	8x SC/LC				8x SC/LC/BFOC	8x SC/LC/BFOC	
XF204/X204IRT/ XF204IRT					4x RJ45				
X202-2IRT					2x RJ45		2x BFOC		
X202-2P IRT					2x RJ45	2x SCRJ			
X201-3P IRT					1x RJ45	3x SCRJ			
X201-3P IRT PRO					1x RJ45 (Push Pull)	3x SCRJ (Push Pull)			
X200-4P IRT						4x SCRJ			
X204IRT PRO					4x RJ45 (Push Pull)				
X202-2P IRT PRO					2x RJ45 (Push Pull)	2x SCRJ (Push Pull)			
X224					24x RJ45				
X216					16x RJ45				
X212-2					12x RJ45		2x BFOC		
X212-2LD					12x RJ45			2x BFOC	
X208/XF208					8x RJ45				
X208PRO					8x M12				
X206-1/XF206-1					6x RJ45		1x BFOC		
X206-1LD					6x RJ45			1x BFOC	
X204-2/XF204-2					4x RJ45		2x BFOC		
X204-2TS					4x RJ45		2x BFOC		
X204-2LD					4x RJ45			2x BFOC	
X204RNA / 204RNA EEC ²⁾					4x RJ45				
1) The specified number of ports pertains to the max. possible number of devices per interface type. The combined number of ports per device is provided in the specific technical data.						2) Comboports can be used as an alternative 3) Maximum configuration with port extender 4) Multimode or Singlemode			

G_IK10_XX_10288

1) The specified number of ports pertains to the max. possible number of devices per interface type. The combined number of ports per device is provided in the specific technical data.

2) Comboports can be used as an alternative
3) Maximum configuration with port extender
4) Multimode or Singlemode

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SCALANCE X managed Industrial Ethernet switches

Port configuration for SCALANCE X Industrial Ethernet switches and components with switch functionality

	Gigabit Ethernet			Fast Ethernet				Unmanaged Switches	
	10 / 100 / 1000 Mbit/s	1000 Mbit/s		10 / 100 Mbit/s	100 Mbit/s				
	Electrical	Optical		Electrical	Optical				
Type of module	Twisted Pair	Multimode	Singlemode	Twisted Pair	POF/PCF	Multimode	Singlemode		
X124				24x RJ45				SCALANCE X-100	
X116				16x RJ45					
X112-2				12x RJ45		2x BFOC			
X108/X108PoE				8x RJ45					
X106-1				6x RJ45		1x BFOC			
X104-2				4x RJ45		2x BFOC			
XB008G	8x RJ45							SCALANCE X-000	
XB008				8x RJ45					
XB005G	5x RJ45								
XB005				5x RJ45					
XB004-1LDG	4x RJ45		1x SC						
XB004-1LD				4x RJ45			1x SC		
XB004-1G	4x RJ45	1x SC							
XB004-1				4x RJ45		1x SC			
X005/X005 TS/ XB005				5x RJ45					
XC100-4OBR		1)	1)	5x RJ45		1)	1)		
1) available as multimode or single mode variants with 4x SC interfaces									

SCALANCE X unmanaged Industrial Ethernet switches

	Gigabit Ethernet			Fast Ethernet				
	10 / 100 / 1000 Mbit/s	1000 Mbit/s		10 / 100 Mbit/s	100 Mbit/s			
	Electrical	Optical		Electrical	Optical			
Type of module	Twisted Pair	Multimode	Singlemode	Twisted Pair	POF/PCF	Multimode	Singlemode	
LOGO! CSM 12/24				4x RJ45				Module for Logic module LOGO!
LOGO! CSM 230				4x RJ45				
CSM 1277				4x RJ45				Module for SIMATIC S7-1200
CSM 377				4x RJ45				
CP 343-1 Lean				2x RJ45				Module/CPs for SIMATIC S7-300
CP 343-1				2x RJ45				
CP 343-1 Advanced	1x RJ45			2x RJ45				
CP 443-1				2x RJ45				CPs for SIMATIC S7-400
CP 443-1 Advanced	1x RJ45			4x RJ45				
CM 1542-1				2x RJ45				CPs for PG/PC
CP 1604				4x RJ45				
CP 1616				4x RJ45				
CP 1623	2x RJ45							

Industrial Ethernet communications processors with switch functionality

Industrial Ethernet Switching

Network management

The network management products SINEMA Server (SIMATIC Network Manager) and SNMP OPC Server support in monitoring and diagnosing wireless and wired networks in industrial environments.

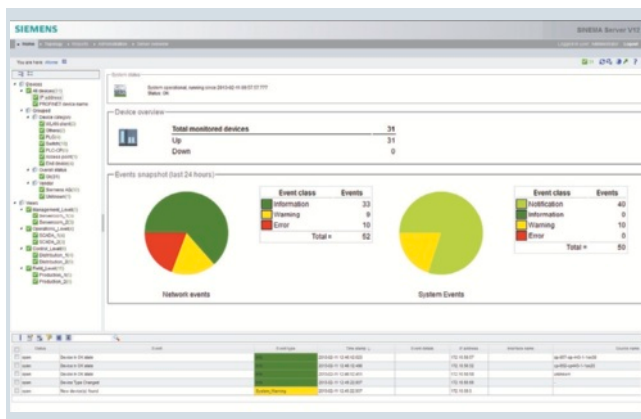
Network diagnostics with SINEMA Server

With a suitable network management system such as the SINEMA Server from Siemens that is specially designed for industrial applications, however, such problems can be detected at an early stage and appropriate measures taken in good time. Even a single failure in the network during operation can result in a rush of alarms from various network nodes which are connected together. The combination of topology know-how with the diagnostics values of individual network nodes is decisive in order to rapidly identify the location and eliminate the cause of a network fault. A complete physical map of the network permits analysis of the possible effects of cable or device faults. This is helpful when planning high-availability applications. Sinema Server also provides maximum openness for Ethernet-based devices from other vendors. These can be detected and diagnosed simply and conveniently via SNMP.

The most important functions

Intuitive operation

SINEMA Server is network management for industry. Attention was paid here to the most important functions for the industrial environment, and these are implemented with a clear interface for intuitive operation. Users can monitor their networks in the shortest time possible. Costly and time-intensive IT training is not necessary.



Automatic device detection and generation of the network topology

With the help of DCP and SNMP, SINEMA Server automatically detects PROFINET and Ethernet devices in the network and represents them graphically in a Web browser. This means that the maintenance personnel in process and production plants can monitor the current status of the devices and their connections (topology) at all times without time-consuming configuration.



User-specific topology display

As well as the automatically generated display of the topology, SINEMA Server also gives users the option of representing the network nodes in any arrangement. These user-specific topologies can also be supplemented with background images (e.g. building or plant diagrams). In the case of faults, this means that the relevant network components can be found and, if required, replaced or repaired more quickly.

Event-triggered alarms

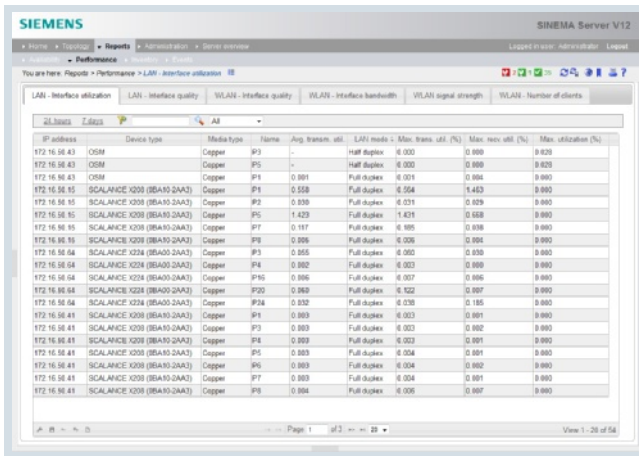
For gap-free and instantaneous monitoring of the network, network messages must be detected immediately and the user must be informed. For this purpose, SINEMA Server offers event handling with which all network event messages are acquired and processed. Users of SINEMA Server are thus supplied with all the important event information concerning the network.

User-defined display

Different personnel with different roles (e.g. administrators, maintenance personnel, etc.) can use SINEMA Server in their daily work. The administrator defines different groups to whom the appropriate rights and views are assigned. Up to 10 people with different tasks can work simultaneously with SINEMA Server.

Comprehensible network reports

Network diagnostics encompasses not only the current status of the network, but also the analysis of historical values. SINEMA Server saves to a database all values read out from the network components. Time-based filtering and evaluation with comprehensible reports can then take place. In this way, all past events can also be analyzed and used to prevent future failures.



IP address	Device type	Media type	Name	Avg. trans. util. (%)	LAN mode - Max. trans. util. (%)	Max. trans. util. (%)	Max. recv. util. (%)	Max. utilization (%)
172.16.50.43	OSM	Copper	IP3	-	Half duplex	0.000	0.000	0.020
172.16.50.43	OSM	Copper	IP5	-	Half duplex	0.000	0.000	0.020
172.16.50.43	OSM	Copper	IP1	0.001	Full duplex	0.001	0.004	0.000
172.16.50.15	SCALEANCE X200 (8EA00-DAK3)	Copper	IP1	0.000	Full duplex	0.000	1.443	0.000
172.16.50.15	SCALEANCE X200 (8EA00-DAK3)	Copper	IP2	0.000	Full duplex	0.000	0.000	0.000
172.16.50.15	SCALEANCE X200 (8EA00-DAK3)	Copper	IP5	1.429	Full duplex	1.429	0.000	0.000
172.16.50.15	SCALEANCE X200 (8EA00-DAK3)	Copper	IP7	0.107	Full duplex	0.100	0.000	0.000
172.16.50.15	SCALEANCE X200 (8EA00-DAK3)	Copper	IP8	0.000	Full duplex	0.000	0.000	0.000
172.16.50.54	SCALEANCE X200 (8EA00-DAK3)	Copper	IP3	0.000	Full duplex	0.000	0.000	0.000
172.16.50.54	SCALEANCE X200 (8EA00-DAK3)	Copper	IP4	0.000	Full duplex	0.000	0.000	0.000
172.16.50.54	SCALEANCE X200 (8EA00-DAK3)	Copper	IP5	0.000	Full duplex	0.000	0.000	0.000
172.16.50.54	SCALEANCE X200 (8EA00-DAK3)	Copper	IP20	0.000	Full duplex	0.000	0.000	0.000
172.16.50.54	SCALEANCE X200 (8EA00-DAK3)	Copper	IP4	0.000	Full duplex	0.000	0.100	0.000
172.16.50.41	SCALEANCE X200 (8EA00-DAK3)	Copper	IP1	0.000	Full duplex	0.000	0.000	0.000
172.16.50.41	SCALEANCE X200 (8EA00-DAK3)	Copper	IP3	0.000	Full duplex	0.000	0.000	0.000
172.16.50.41	SCALEANCE X200 (8EA00-DAK3)	Copper	IP4	0.000	Full duplex	0.000	0.000	0.000
172.16.50.41	SCALEANCE X200 (8EA00-DAK3)	Copper	IP5	0.000	Full duplex	0.000	0.000	0.000
172.16.50.41	SCALEANCE X200 (8EA00-DAK3)	Copper	IP6	0.000	Full duplex	0.000	0.000	0.000
172.16.50.41	SCALEANCE X200 (8EA00-DAK3)	Copper	IP7	0.000	Full duplex	0.000	0.000	0.000
172.16.50.41	SCALEANCE X200 (8EA00-DAK3)	Copper	IP8	0.000	Full duplex	0.000	0.000	0.000

Diagnostics via Web browser

Access to network diagnostics should not be locally restricted, particularly in the case of large networks. That's why SINEMA Server has been developed on the basis of a server architecture. This enables access to the network management software via commonly used Web browsers. In this way, the network to be checked can also be diagnosed from any location. This enables the network diagnostics tasks of several plant sections to be bundled in one control room.

Integration into HMI/SCADA systems

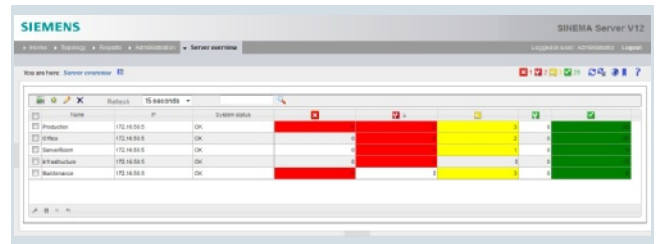
To have everything in view, network diagnostics should be integrated in the HMI/SCADA plant solution. SINEMA Server offers full integration of the topology via the Web browser. In addition, all parameters, e.g. warnings and faults, can be transferred via the integrated OPC interface. This enables users to integrate network diagnostics into HMI/SCADA systems without a high engineering outlay.

Adaptable device profiles

Users have the option of optimizing the device display by means of the profile concept, particularly for non-Siemens network components represented by SINEMA Server via standard SNMP information. Scanning of device-specific data via SNMP can also be set via the profile. This means that an industrial network comprising devices from different manufacturers can be optimally monitored with SINEMA Server.

Adaptable quantity structure with up to 50,000 network nodes

Different SINEMA Server licenses can be selected depending on the size of the network. SINEMA Server monitors large networks with up to 500 nodes with one installation. With extremely large production networks, SINEMA Server is able to display up to 100 further SINEMA Servers. In this way, individual production cells can be monitored centrally from a single SINEMA Server station, for example



The most important applications at a glance:

- Automatic documentation of networks
- Application-specific structuring and visualization of a network
- Reporting of changes and faults in the network
- Analysis of changes and faults in the network
- Integration of network diagnostics into HMI/SCADA
- Adaptation of monitoring functionality to devices and users

Sinema Server provides maximum openness for Ethernet-based devices from other vendors. These can be detected and diagnosed simply and conveniently via SNMP.

SNMP OPC Server

Through the SNMP OPC server the diagnostic and configuration data of SNMP-capable devices, such as network components, can be displayed in HMI systems such as WinCC or in the SIMATIC Maintenance Station. Using this software, standard maintenance data can be read and simple plant network problems, such as failure of a cable, can be quickly and easily detected.

Configuration of the SNMP diagnostics is integrated in STEP 7. Ethernet devices can be read from a STEP 7 project or, using the autodiscovery function, directly from the live network. The user can easily add all devices detected there to the device list for monitoring on the OPC Server.

Industrial Ethernet Switching

Diagnostics and network management

Module type	Diagnostics options for components with switching functionality										
	LED	Fault signaling contact	Message screen	PROFINET diagnostics	Web-based management	Diagnostics via SNMP	VLAN	IGMP-Snooping/-Querier	RSTP	Multicast / broadcast limiting	Layer 3 (IP-Routing)
SCALANCE X-500	•	•	•	•	•	•	•	•	•	•	•
SCALANCE X-400	•	•	•	•	•	•	•	•	•	•	• ¹⁾
SCALANCE X-300	•	•	•	•	•	•	•	•	•	•	
SCALANCE X-200	•	•	•	•	•	•					
SCALANCE X-100	•	•	•								
SCALANCE X-000	•										
CSM	•										
CP for S7-300	•			•	• ¹⁾	•					
CP for S7-400	•			•	• ¹⁾	•					
CM for S7-1500	•			•	• ¹⁾	•					
CP 1604	•			•	• ¹⁾	•					
CP 1616	•			•	• ¹⁾	•					
CP 1623	•					•					
¹⁾ Port diagnostics possible via integral web server											

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Industrial Ethernet switches and components with switch functionality: Network structure diagnostic options and logs

Industrial Ethernet

Cabling with FastConnect

FastConnect for electrical cables

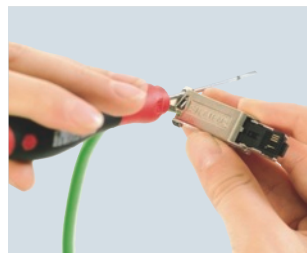
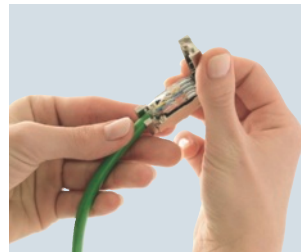
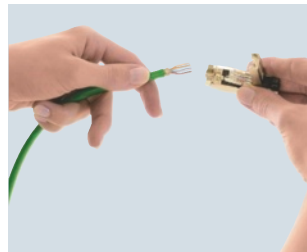
The rapid connection system FastConnect (FC) for Industrial Ethernet enables industry-compatible network structures to be set up within a short time using optimally matched components. It comprises:

- **Industrial Ethernet FastConnect cables** specially designed for fast assembly (UL and CAT5e/Cat6 certified) e.g. FC TP Standard, FC TP Flexible, FC TP Trailing and FC TP Marine Cable
- User-friendly stripping technology with the **FastConnect stripping tool**, enabling the outer sheath and braided shield to be removed accurately in a single operation
- Cables prepared in this way are connected to the FastConnect products using the insulation displacement technique.
- **IE FC RJ45 Plug and IE FC M12 Plug PRO** are insensitive to interference due to the rugged metal enclosure, and are the ideal solution for installing RJ45 or M12 connectors at the field level (PROFINET-compliant)
- **Industrial Ethernet FC Modular Outlets** are connection sockets for structured cabling with Fast and Gigabit Ethernet

Advantages of the FastConnect system for electrical cables

- Comprehensive product range for flexible wiring in industry in accordance with the innovative PROFINET Industrial Ethernet standard
- Minimized time taken to connect data terminals thanks to safe stripping of the outer sheath and braided shield in one step
- Simple connection system
 - Insulation-displacement contacts for 4-core (Cat5) and 8-core (Cat6) Industrial Ethernet FC twisted-pair installation cables
 - SC or BFOC connection system for FC glass fiber-optic cable
- Easy assembly for both TP cable types with the preadjusted FC stripping tool or FC FO termination kit for FC glass FOC
- Reliable shield contact and strain relief thanks to screw-on cover
- Good EMC shielding and conduction (metal casing); mistakes are prevented thanks to color coding and the transparent terminal cover
- RJ45 cabling technology is used as the existing standard

Assembly with FastConnect for RJ45 and M12 connectors



Industrial Ethernet

Cabling with FastConnect

FastConnect for glass fiber-optic cables

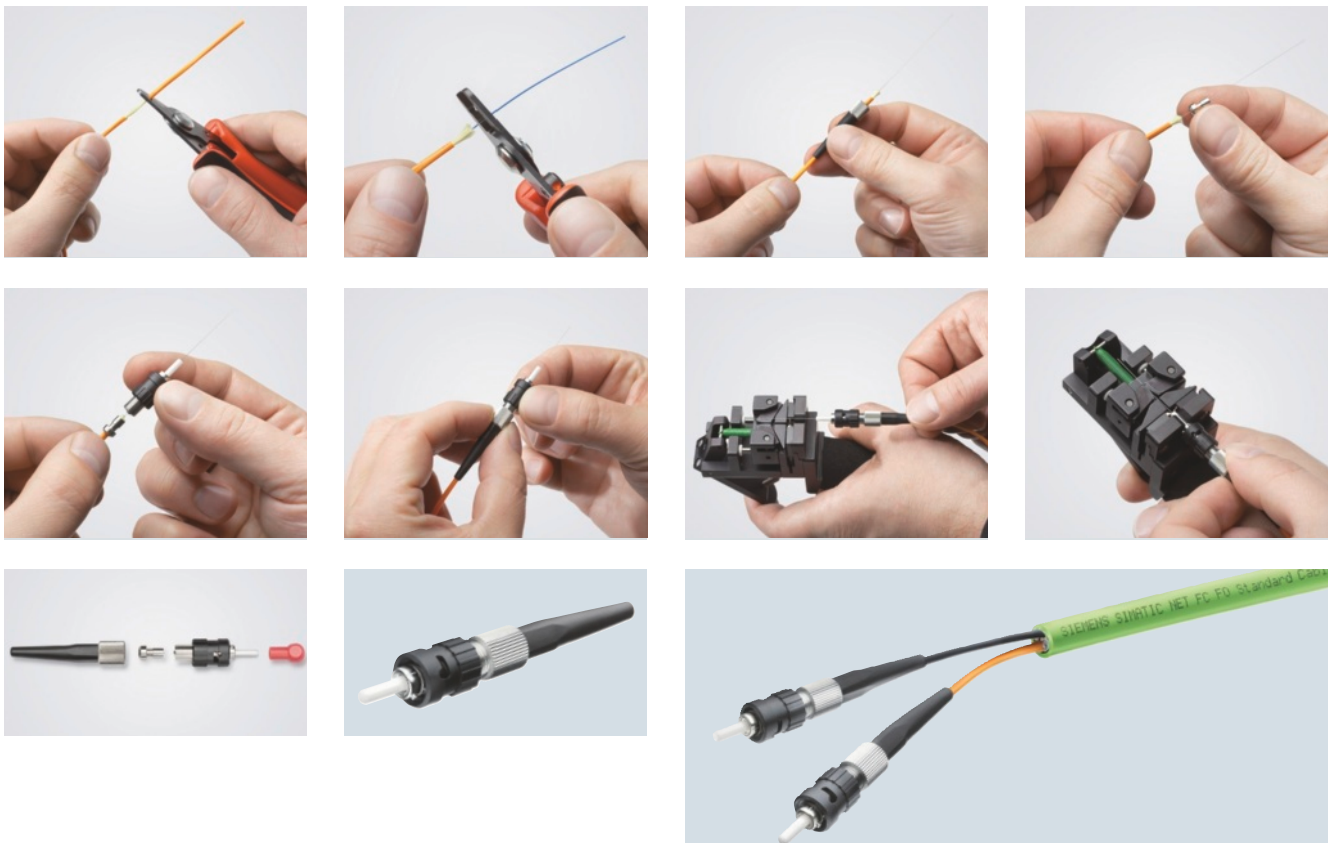
For the FastConnect FOC system, fiber-optic cables with glass core (62.5/200/230) are offered. They are suitable for easy assembly in the field:

- **FC FO Standard Cable GP;** 62.5/200/230 with PVC casing for permanent indoor installation
- **FC FO trailing cable;** for use in tow chains and moving applications
- FastConnect glass fiber-optic cables are assembled on-site using the **FC FO termination kit**. The termination kit permits the stripping and the "cleaving" of the fiber in the assembled connector.
- **FastConnect SC** and **FastConnect BFOC connectors** are available for the assembly of FC glass fiber-optic cables

Advantages of the FastConnect system for glass fiber-optic cables

- Simple installation of the unassembled cable
- Flexible connector assembly on site (SC/BFOC connectors) without skilled personnel
- Prevention of faults by simply checking the assembled connectors on site using a microscope
- Simple repair of FC glass fiber-optic cables in the field

Assembly with FastConnect for glass fiber-optic cables

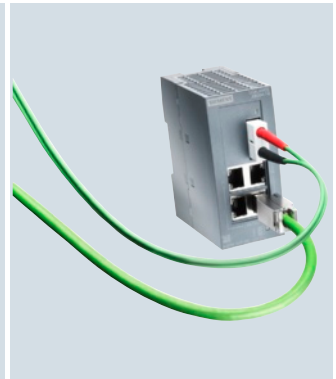


SCALANCE X Industrial Ethernet switching

Advantages at a glance

- Rugged industry-compatible design
- The right construction type for any application
- Protection of investments: Existing networks can be expanded with new products
- Integration into existing concepts for network security thanks to integral security functions
- Broad-based use in small or large networks even outside the control cabinet
- Avoidance of additional training and familiarization costs thanks to the use of standardized Ethernet technology
- High network and machine availability

- One network for strict real time and standard TCP/IP, saving on duplicated infrastructure
- Reduction of downtimes due to saving of engineering and configuration data
- Quick, easy and reliable cabling and the option of self-assembly
- On-site or remote parameterization and diagnostics
- Support from SIMATIC Engineering Tools
- Embedding in the SIMATIC fault message concept (system fault signaling, SFM) and PROFINET
- Networking without the need for additional gateways



Get more information

SIMATIC NET:

<http://www.siemens.com/automation/simatic-net>

SCALANCE X Industrial Ethernet switches:

www.siemens.com/switches

RUGGEDCOM Industrial Ethernet switches:

www.siemens.com/ruggedcom

Info material for downloading:

<http://www.siemens.com/automation/infocenter>

Service & Support:

<http://www.siemens.com/automation/service&support>

SIMATIC NET contacts:

<http://www.siemens.com/automation/partner>

Industry Mall for electronic ordering:

www.siemens.com/industrymall

Industrial Security

Siemens provides automation and drive products with industrial security functions that support the secure operation of plants or machines. They are an important component in a holistic industrial security concept. With this in mind, our products undergo continuous development. We therefore recommend that you keep yourself informed with respect to our product updates. Please find further information and newsletters on this subject at: <http://support.automation.siemens.com>

To ensure the secure operation of a plant or machine it is also necessary to take suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art holistic industrial security concept for the entire plant or machine. Any third-party products that may be in use must also be taken into account. Please find further information at:

<http://www.siemens.com/industrialsecurity>

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